

# The Iron Age

A Review of the Hardware, Iron and Metal Trades.

Published every Thursday Morning by DAVID WILLIAMS, No. 83 Reade Street, New York. Entered at the Post Office, New York, as Second-Class Matter.

Vol. XXXI: No. 21.

New York, Thursday, May 24, 1883.

\$4.50 a Year, Including Postage.  
Single Copies, Ten Cents.

## Interesting Relics for the Chicago Railway Exposition.

It is stated that the Baltimore and Ohio Railway Co. will send to the Chicago Railway Exposition the first successful locomotive engine built for their road. This locomotive is the well-known "Arabian," No. 1. It is not, as is generally supposed, either the first engine built by the company or the first engine that pulled a train on a curved road. It was built at the company's shops, under the supervision of its designer, Mr. F. Davis, and went into service in June, 1834. It has been carefully guarded and repaired, and with very little difference is stated to be precisely the same engine that it was 49 years ago. It is claimed to be the oldest effective locomotive in the United States, and perhaps in the world. The engine has a vertical cylinder and a walking-beam. There are four driving-wheels, each 36 inches in diameter, or about one-half the size of the drivers used on modern passenger locomotives. The weight of the "Arabian" is 13 tons, about one-third that of the modern locomotive. The engine was originally provided with fans connected with the exhaust, but these were broken and no attempt has been made to restore them, and with this exception it is the same engine as when first put upon the road. For a great number of years it served as a passenger engine drawing trains on both the Washington branch and the main line, and, so far as could be learned, it had never met with an accident, jumped a rail or run off the track, with one exception. This exception was a notable one. Before the engine was finished the designer, Mr. Davis, promised the workmen engaged in the shops, some 300 in number, to take them and their families on a train drawn by the "Arabian" as far as it went, and then go to Washington. The Washington branch was then open nearly to Bladensburg. While making the trip and when 13 1/4 miles from Baltimore the engine ran off the track and rolled on its side. With the exception of Mr. Davis, who was killed, nobody on the train was hurt. Nobody could tell why the "Arabian" ran off the track. There was no evidence ever shown, although an extensive investigation was made, that any cause existed to throw it off. The engine will be taken to Chicago by Mr. Thomas Galloway, and visitors to the Exposition will thus have an opportunity of seeing the oldest effective locomotive engine in the world, run by the oldest living railway engineer, an incident in railway history which is not without interest.

Another old locomotive to be exhibited at the exposition is the "Samson," which recently passed through Toronto on its way to Chicago. The "Samson" was built in August, 1838, by Timothy Hackworth, of New Sheldon, Durham, England, and brought to America in the same year, and has been used ever since in the Albion coal mine, near Stellarton, N. S. The locomotive is a standard gauge inverted direct-acting engine, with 4-foot drivers. As in all locomotives of this class, her cylinders are perpendicular, and are placed at the back of the engine on each side of the engineer. The piston-rods act on the hind wheels, which, in turn, are connected with those in the middle and in front. The furnace door is in front, and the tender runs ahead, giving the whole machine a very singular appearance. The passenger car which accompanies this relic is also a curiosity, being one of the old-fashioned coaches, capable of comfortably holding four persons, two on each seat. The doors are at the sides, as is still the case on many English railways, and a step runs along each side the whole length of the coach.

**The Oldest Alpine Tunnel.**—The heading driven through Mont Viso at the instigation of Louis II, Margrave of Saluzzo, and constructed from 1473 to 1480, may probably be looked upon as the oldest Alpine tunnel in existence. The difficult passes over Mont Genève and Mont Cenis, which before that time were the only means of communication between Northern Italy and Dauphiné, but which entailed a very heavy expense upon the inhabitants of Saluzzo, and were, besides, frequently rendered impassable on account of the many little border wars, suggested to the Margrave the plan of making a direct road through Mont Viso between the valley of the Po and that of Queyras, opening on to the Durance. The negotiations entered into with the estates of Dauphiné and Louis XI, King of France, led in 1477 to a satisfactory arrangement, and the tunnel was completed a few years later by Martino d'Albano and Baltasar d'Alpiasco, at a total cost, including the paths leading to it, of 12,000 florins. The tunnel has a height of 6 1/2 feet, and an average width of 8 feet, and at the present time a length of only about 250 feet; but it is stated that, in consequence of frequent landslips, the openings have gradually receded, and the tunnel, when first constructed, may have had double that length. The geological structure of the mountain is similar to that of Mont Cenis, so that frequent irruptions made repeated clearances necessary. During times of war, the tunnel has been frequently blocked, and even walled up, but it was made perfectly passable again by orders of Napoleon I.

## New Rail Cambering Arrangement.

The Lackawanna Iron and Coal Co., of Scranton, Pa., have lately put into operation a new rail-cambering arrangement, the invention of Mr. W. K. Seaman, who is connected with the drafting department of the company. The purpose of the improvement is to do away with the objectionable feature

cured a series of "idler" guide rolls, B, B', &c., which guide the rail to the first pair of driven or "grip" rolls C, which forward it thence through the guide rolls B' to the second pair of grip rolls C', thence through the guide rolls B' to a third pair of grip rolls, and so on successively till it reaches the cambering or bending machine E, Fig. 1, which delivers it on the hot-bed with the re-

two cambering machines, for the following reasons:

1. It is thereby rendered possible to transmit the rail across the first bed and to the second cambering machine while it is still straight, the bending roll of the first cambering machine being invariably thrown back, so that this machine acts simply as a pair of grip rolls when the second cambering ma-

tion; the drum shaft I I through the reversing friction clutch O in either direction at will, and the grip rolls, through the reversing friction clutch L in either direction at will.

With the drum shaft I I we shall have little further to do; its function is simply to slide the rail over the surface of the hot-bed in either direction from the center, by means of operating traverse buggies running on top of the rails of the bed. These buggies are drawn back and forth by endless wire ropes passing over sheaves at either end of the bed and around the drums T T at the center several times in the ordinary way. By means of crab couplings on the drum shaft, either pair of drums can be operated at will, while the other pair stands still, these couplings being reversed only, of course, when one bed is filled with rails and the other is to be used.

By means of the grip rolls the rail is adjusted to and held in the proper position for having its ends cut off by the hot saws D D, Figs. 1 and 3. These saws are suspended in rigidly trussed swings, and are fed across the rail by a hydraulic cylinder fixed on the central countershaft stand. The swings and feeding connections are of ample proportions, and are so designed as to insure steadiness and freedom from vibration to the saw mandrel. Both the friction reversing clutches O and L and the hydraulic cylinder feeding the saws are operated by hand levers, Y, Y', Y'', conveniently arranged upon the elevated working pulpit V, Fig. 1. The operator faces the rail as it lies before the saws; looks toward his right, whence he receives it from the train; in front, when he adjusts it for sawing, and cuts off the ends; and toward his left, when he traverses it across the hot-bed, after it has passed through the cambering machine.

Having thus described the general arrangement, the details, beginning with the "grip" or forwarding rolls, will next be considered. But one roll of each pair of grips is driven; the other roll runs free on its axle. The driven roll runs in fixed bearings, top and bottom, and receives its motion directly from the line shaft J, situated vertically below it, through a pair of miter gears. The loose roll is capable of all the required adjustment for different rail sections in the following manner: The axle on which it turns is supported top and bottom by the frame of the machine; these two supports have a common axis, while that portion of the shaft around which the roll revolves is eccentric with them. Now, to vary the distance between the two rolls it is only necessary to turn the roll-shaft, in its supports, through a portion of a revolution, and clamp the shaft firmly in the desired position by a nut. A square end is provided on the shaft, above the nut, whereby the shaft is turned in its supports and held while being clamped.

The rail enters the machine as indicated by the arrow, its weight being carried by the web on the rolls w, Fig. 3, throughout the entire arrangement. These rolls are so placed that for all common sections of rails their position does not require adjustment of any kind. It will be seen that the shaft J, inaccessible, apparently, at first sight, can be removed without disturbing the sole-plate, which is firmly bolted and sulphured to the foundation. Without calling special attention to this point for each machine, it may be here stated that this feature has been embodied in all the details whose positions are over the shaft J. Further, the bearings of the shaft J are all in accessible positions for inspection and oiling; this position of these shafts was selected because it did away with so much mechanism necessary in existing arrangements.

We shall next consider the two cambering machines, the position of one of them being indicated at E, Fig. 1, the second being situated on the further end of the shaft J, between the first and second hot-bed, the latter not shown. Figs. 6, 4 and 7 (plan and two sectional elevations) show the details of these machines. They are simply combinations in one machine of two pairs of grip rolls, b, d and b', d', with a bending roll, f. One roll, b, b', of each pair of grip rolls is driven directly, through miter-gears, from the shaft J; these rolls run in fixed bearings, are in no way adjustable, and are the only driven rolls in the entire machine. The rolls d, d', are adjustable by the eccentric arrangement before described. The roll f has precisely a similar means of adjustment, but it is retained in the desired position by the lever n, running over the slotted segment p and clamped by the nut o. This segment can be graduated (from practice) for the various rail sections, and the adjustment of the lever n gives the required variation in camber in a most simple manner. The ends of the rail (where sharp upward bends are liable to exist as it is delivered from the train) having been invariably sawn off before it reaches the cambering machine, it is admissible to put the upper bearings of the rolls of this machine in a continuous frame, I, above the rolls; by this means a much more rigid construction is obtained than is possible where both bearings are below the rolls; also, by placing the upper bearings of the shafts above the work, they are protected from scale—two important features. The lower bearings and miter gears are completely protected from the scale by the

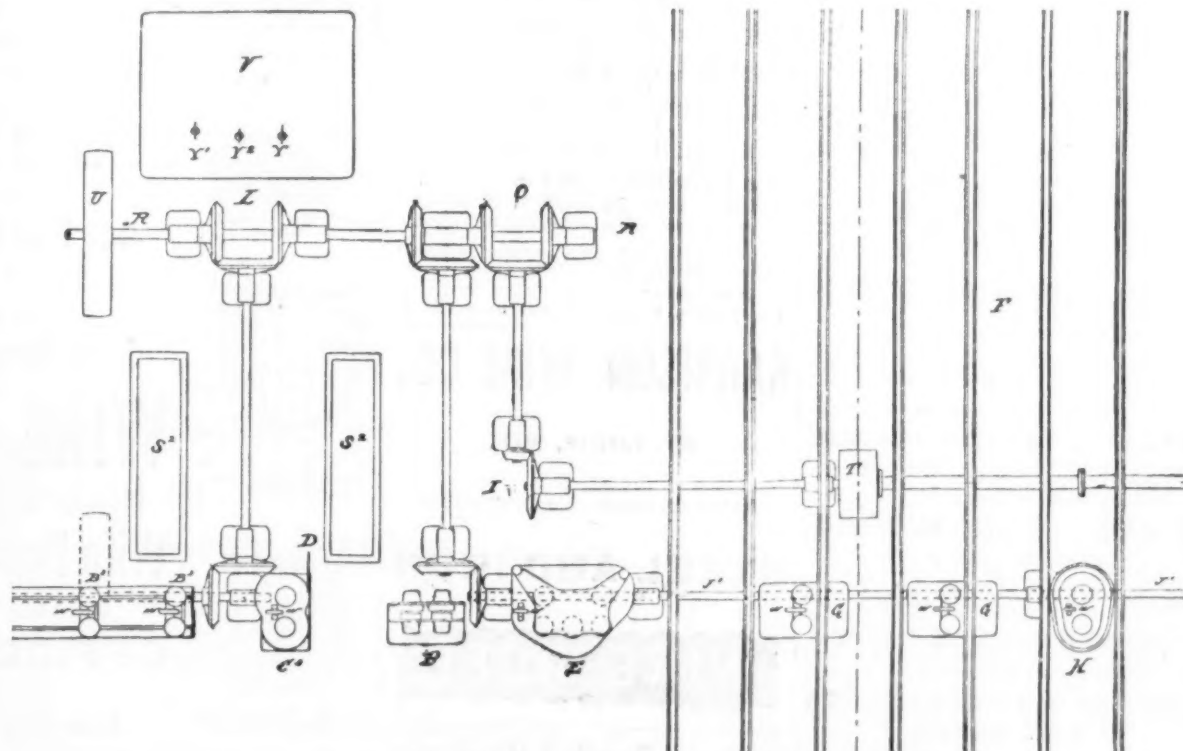


Fig. 1.—Last Set of Grip Rolls, Driving Mechanism and Portion of First Hot-Bed.

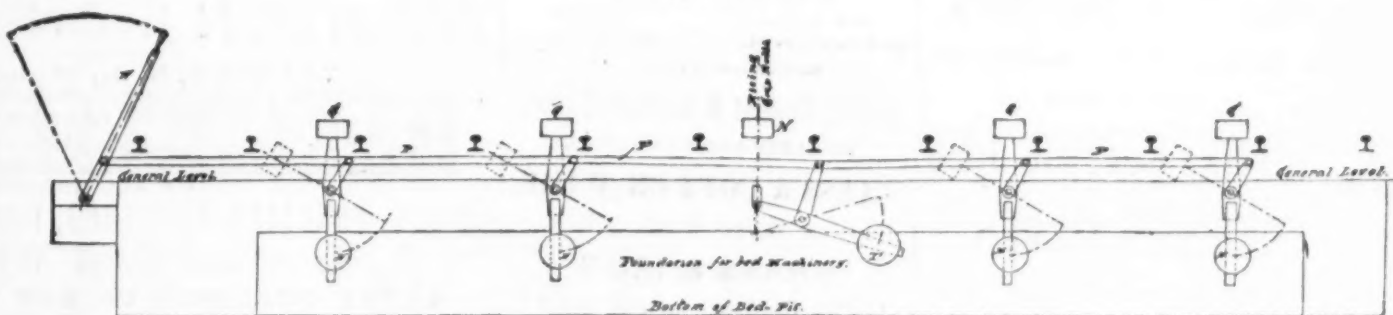


Fig. 2.—Hot-Bed No. 1.

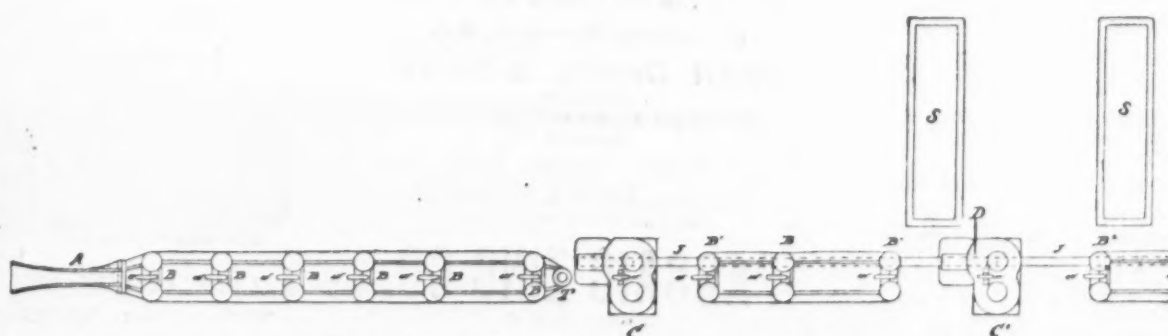


Fig. 3.—General Plan of Switch and Adjacent Grip Rolls.

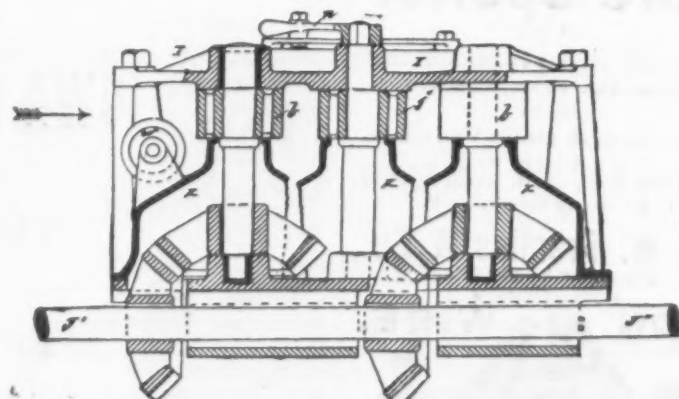


Fig. 4.—Section Through Rolls of Cambering Machine.

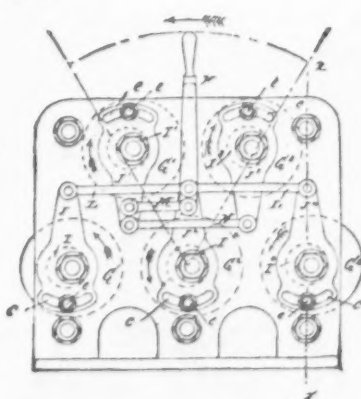


Fig. 5.—Side Elevation of Hot-Rail Straightening Machine.

## RAIL CAMBERING ARRANGEMENT, DESIGNED BY WILLIAM K. SEAMAN.

of cold-straightening steel rails. The invention has been the subject of a paper read by Mr. Seaman before the American Society of Mechanical Engineers, of which we avail ourselves in the description of the plant, which is now in successful operation.

In Fig. 3, A designates the mouth of the switch, which receives the rail from the finishing rolls, the switch being made to swing on the pivot T, so that its mouth can be adjusted to receive the rail from either of the finishing passes. On the switch are se-

quired curve. It will be seen that a second hot-bed is provided, and that between the rails of the first bed is placed the necessary machinery for transmitting the rail across this bed and to the second cambering machine and its hot-bed. Two hot-beds are necessary, otherwise the capacity of the apparatus for properly cooling the rails would not equal that of the train for rolling them, and the latter machine would necessarily be restricted in output. It is thought highly advantageous to have

chine is being used and the second bed is being filled with rails.

2. By the use of two cambering machines it is rendered possible to continue work at the rail train in case of the derangement from any cause of either cambering machine. RR, Fig. 1, indicates the main or engine shaft driving the entire arrangement; the saw countershaft (not shown) constantly in one direction by belting from the pulley U; the cambering machines and grip rolls H by plain miter-gears, constantly in one direc-



**ANSONIA**  
BRASS & COPPER CO.,  
No. 19 CHURCH Street,  
Phelps Building, NEW YORK.

MANUFACTURERS OF  
**BRASS AND COPPER**

IN  
Sheets, Bolts, Rods, Wire, &c.  
**Seamless Brass & Copper**  
Tubing.

Ansonia Corrugated Stove Platforms.  
**PURE COPPER WIRE**  
Electrical Purposes, Bare and Covered.  
Phosphor Bronze Rods for Pumps, &c.

**ANSONIA ★ REFINED**  
**INGOT COPPER.**

**PHELPS, DODGE & CO.,**

IMPORTERS OF  
**TIN PLATE,**  
ROOFING PLATE,

Sheet Iron Copper, Pig Tin, Wire,  
Zinc, &c.

MANUFACTURERS OF  
**COPPER AND BRASS.**  
CLIFF STREET, NEW YORK.

**SCOVILL MFG CO**

**BRASS,**  
HINGES WIRE, GERMAN SILVER.

PHOTOGRAPHIC GOODS.

**BUTTONS,**  
CLOTH AND METAL.

DEPOTS, FACTORIES,  
419 & 421 Broome St., N. Y. Waterbury, Conn.  
177 Devonshire St., Boston. New Haven, Conn.  
183 Lake St., Chicago. New York City.

**DICKERSON, VAN DUSEN & CO.,**

Importers of  
Tin Plate, Pig Tin, Sheet Iron, Copper,  
Wire, Zinc, Etc.  
29 & 31 CHURCH St., cor. Fulton,  
DICKERSON & CO., Liverpool. NEW YORK.

**THE NEW HAVEN**  
**COPPER CO.,**

SOLE MAKERS OF  
**POLISHED COPPER**

Under Patent of T. James, Sept. 12, 1876.  
ALSO MANUFACTURERS AND  
DEALERS IN

**BRAZIERS & SHEATHING COPPER,**

Kettles, Bottoms, Bolts, Circles, &c.  
290 Pearl Street - NEW YORK.

**A. C. NORTHROP,**

Waterbury, Conn.,  
**NOVELTIES IN BRASS AND OTHER METAL GOODS**  
FOR HARDWARE TRADE.

Wrought Iron and Brass Machine Screws; Turned, Hexagon, Round and Square Head Cap and Flat Screws; Brass and Iron Safety and Jack Chain; Gilt, Nickel Plated and Bronze Trimmings of all kinds, from Sheet Iron, Steel or Brass.  
Estimates on patented articles, or any description of Sheet Metal work, respectfully solicited and promptly given.

**BRODERICK & BASCOM ROPE CO.,**

MANUFACTURERS OF

**WIRE ROPE**  
BRODERICK & BASCOM ROPE CO.

**IRON WIRE ROPE. STEEL WIRE ROPE.**  
728 N. Main St., St. Louis, Mo.

**WORCESTER WIRE CO.,**

Manufacturers of  
**IRON AND STEEL**  
**WIRE**  
For all Purposes.  
WORCESTER, MASS.



**Waterbury Brass Co.**

CAPITAL, \$400,000.  
Sheet, Roll and Platers' Brass,  
**GERMAN SILVER,**  
Copper, Brass and German Silver Wire,  
BRASS AND COPPER TUBING,  
**COPPER RIVETS AND BURS,**  
**BRASS KETTLES,**  
**Door Rail, Brass Tags,**  
**PERCUSSION CAPS,**  
**POWDER FLASKS,**  
Metallic Eyelets, Shot Pouches, Tape Measures, &c.  
And small Brass Ware of every Description.  
Cartridge Metal in Sheets or Shells a Specialty.  
Sole Agents for the

Capewell Mfg. Co.'s Line of Sport-  
ing Goods.

DEPOTS, MILLS AT  
296 Broadway, New York. WATERBURY,  
125 Eddy St., Providence, R. I. Conn.

**Detroit Copper & Brass**  
**Rolling Mills.**

BRAZIERS' AND SHEATHING COPPER,  
ROLLED, SHEET & PLATERS' BRASS  
GERMAN OR NICKEL SILVER,  
Copper Wire for Electrical and other purposes,  
Brass and German Silver Wire,  
Copper Rivets and Burs,  
COPPER BOTTOMS FOR TEA KETTLES AND BOILERS.  
Cor. Larned & Fourth Sts., Detroit, Mich.

**ROME IRON WORKS,**

Manufacturers of  
Brass, Gilding Metal, Cop-  
per and German Silver  
(In Sheets, Rods, Tubing or Wire),  
**COPPER & BRASS RIVETS**  
**AND BURS.**  
Rome, New York.

**BROWN & BROTHERS,**

81 Chambers St., N. Y. Waterbury, Conn.

MANUFACTURERS OF  
**BRASS, COPPER AND**  
**GERMAN SILVER**

In Sheets, Rods, Wire, Tubing,  
Rivets, and Burs, Etc.

ALSO,

**Seamless Brass & Copper Tubing.**

PATENTED SEAMLESS BRASS AND COPPER  
HOUSE BOILERS, warranted to stand 200 lbs  
pressure and guaranteed against vacuum.

PATENTED SPRING TEMPERED SHANK,  
SILVER-PLATED, FLAT TABLE WARE, in rich  
designs.

GERMAN SILVER SPOONS AND FORKS.

**The Plume & Atwood**  
**Mfg. Company,**

MANUFACTURERS OF  
**SHEET and ROLL BRASS and WIRE,**  
German Silver and Gilding Metal,  
Copper Rivets and Burs,  
Copper Electrical Wire, Pins,  
Brass Butt Hinges,  
Jack Chain,  
Kerosene Burners,  
Lamp Trimmings, &c.

18 Murray Street, New York.  
13 Federal Street, Boston.  
109 Lake Street, Chicago.  
Rolling Mill, THOMASTON, CT. Factories, WATERBURY, CT.

**Bridgeport Brass Co.,**

MANUFACTURERS OF  
Sheet and Roll Brass,  
Brass & Copper Wire & Tubing,  
Seamless and Brazed Tubing,  
Copper and Iron Rivets.

OILERS and CUSPADORES, LAMPS and TRIMMINGS,  
LANTERNS and TRIMMINGS, KEROSENE BURNERS,  
Clocks & Fly Fan Movements, PLUMBERS' MATERIALS.

Particular attention paid to cutting out Blanks  
and manufacturing Metal Goods.  
MANUFACTORY, WAREHOUSE,  
Bridgeport, Conn. 19 Murray St., N. Y.

**HARRISON WIRE CO.,**

ST. LOUIS, MO.,

MANUFACTURERS OF ALL KINDS OF

**STEEL AND IRON**

**WIRE ROPE**

**Holmes, Booth & Haydens,**

WATERBURY, CONN.  
NEW YORK, BOSTON,  
49 Chambers St. 18 Federal St.

Manufacturers of all kinds of

Brass, Copper & German Silver,  
ROLLED AND IN SHEETS.

BRASS & COPPER WIRE,  
Tubing, Copper Rivets & Burs.

**BRASS & IRON**  
JACK CHAIN, DOOR RAIL.

German Silver Spoons,  
SILVER PLATED FORKS & SPOONS,  
Kerosene Burners, &c.

**JOHN DAVOL & SONS,**

Agents for  
Brooklyn Brass & Copper Co.,  
Dealers in  
Ingot Copper, Spelter, Lead, Tin,  
Antimony, Solder & Old Metals.  
100 John Street, New York.

**PASSAIC ZINC CO.**

Manufacturers of  
**Pure Spelter**

FOR  
Cartridge Brass, Gas Fixtures, Bronzes  
AND ALL FINE WORK.

Also for  
Galvanizers & Brass Founders.  
MANNING & SQUIER, Gen'l Agents,  
112 Liberty Street, N. Y.

**Geo. W. Prentiss & Co.,**

HOLYOKE, MASS.,  
MANUFACTURERS OF

**IRON WIRE.**



Bright, Coppered, Annealed and Tin  
Plated. Also GUN SCREW WIRE  
Of all sizes straightened and cut to order.

No. 35 3/4 x 1/8

**BROWNING, SISUM & CO.,** 85 Chambers St.  
Manufacture  
Belt Hooks, Cotters, Spring Keys, D Rings  
Samples, and everything pertaining to wire bending  
Factory BROOKLYN.

PHILIP L. MOEN, President and Treasurer. CHAR. F. WASHBURN, Vice President & Secretary.  
**WASHBURN & MOEN MANUFACTURING CO.**  
Established 1831. WORCESTER, MASS.



MANUFACTURERS OF  
**IRON and STEEL WIRE,**

Patent Steel Barb Fencing, Patent Steel Wire Bale Ties.  
WIRE RODS of all Grades: Round Iron, Rivet quality, 3/4 in. to 4 in. cut to any length. Owners and agents  
of the PATENT CONTINUOUS ROLLING MILL, producing Iron and Steel WIRE in  
coils of 100 pounds, without seam or weld. Patent Galvanized Telegraph Wire, Market and Stone Wire,  
Annealed Fence and Grape Wire in long lengths: Coppered Rail-Ball Wire; Rope, Bridge, Bolt-Screw, Steel, Buckle  
and Chain Wire. Wire for the manufacture of Card Clothing, Heddies, Reeds, &c. Piano-string Covering Wire,  
Tinned Broom Wire and Tinned-plated Wire of all sizes. A specialty is made of Clock, Machinery, Gun Screw and  
Spiral Spring Wire, and Refined Wire to Pattern for particular purposes, from selected stamps of Forway Iron.  
Any grade of Wire furnished, Annealed, Bright, Polished, Coppered, Galvanized or Tin Plated. Wire furnished,  
Straightened and Cut to any length. Steel Grindstone Wire, Patent Linen Finish. Galvanized Steel Music  
Wire. Steel Wire for Springs, Needles and Drills. Market Steel Wire kept in stock, all sizes.  
WAREHOUSES: New York, 16 CHURCH, and 241 Pearl St. Chicago, 107 and 109 Lake St.

**HOWARD & MORSE,**  
Warehouse:  
45 Fulton Street,  
NEW YORK,

Manufacturers of  
**Iron, Brass & Copper**  
**WIRE CLOTH,**

Plain and Ornamental Wire Work,  
**Wire Fence & Railing,**

DOOR AND WINDOW GUARDS,  
**OFFICE RAILING,**

ALSO,  
**Iron Stable Fixtures.**

ABRAM S. HEWITT, President. JAMES HALL, Treasurer.  
WM. HEWITT, Vice President. E. HANBON, Secretary.  
**THE**  
**TRENTON IRON COMPANY,**

(INCORPORATED 1874)  
TRENTON, N. J., Manufacturers of

**IRON and STEEL WIRE**

OF ALL GRADES,  
BRIGHT, ANNEALED, COPPERED, TINNED AND GALVANIZED

Iron and Steel Wire Rods;  
**EXTRA QUALITIES OF BAR IRON AND RODS.**

Best Qualities of Gun-Screw and Charcoal Iron Wire;  
Crucible, Siemens-Martin and Bessemer Steel Wire.

Wire Straightened and Cut to Lengths.  
New York Office, COOPER, HEWITT & CO., 17 Burling Slip.  
Philadelphia Office, JOHN HEWITT, Agent, at North Fourth St.

**WIRE ROPE**  
**HAZARD MFG CO.**

WAREHOUSES:  
87 LIBERTY STREET, NEW YORK.  
Works: WILKESBARRE, PA.

This Advertisement Changed Weekly.

**IOWA BARB WIRE CO.,**

87 Liberty St., NEW YORK.

89 Lake St., CHICAGO.

STAUFFER, MACREADY & CO., New Orleans, La. CARLIN & FULTON, Baltimore, Md.

**A. LESCHEN & SON,**

Manufacturers of  
**WIRE ROPE**

OF EVERY DESCRIPTION.  
919 to 923 N. Main St., ST. LOUIS, MO.

Correspondence invited.



**O. LINDEMANN & CO.,**  
Manufacturers of  
Japanned, Brass,  
Tin Plate  
and Wood

**BIRD  
CAGES.**

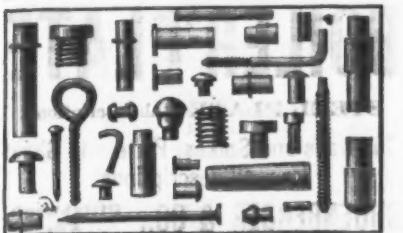
Original Inventors  
and patentees of  
Bright Metal Cages,  
constructed without  
solder.

254 Pearl St.,  
NEW YORK.

**CARY & MOEN,**  
Manufacturers of  
**STEEL WIRE** for all purposes, and **STEEL SPRINGS** of every description.



Market Steel Wire, Crinoline Wire, tempered and covered.  
Also Patent Tempered Steel Furniture Springs, constantly on hand.  
234, 236 and 238 West 29th Street,  
NEW YORK.



**POPE, COLE & Co.**

**BALTIMORE  
COPPER WORKS,**

No. 57 South Gay St., BALTIMORE, MD.,

Have always on hand and for sale

**INGOT COPPER,**

Also Cakes, of unequalled purity and toughness.

**G. Gunther,**  
Manufacturer of  
Patented Brass, Silver Plated  
and Japanned

**BIRD CAGES.**

Can be nested for ex-  
port shipments.

46 Park Place,  
NEW YORK.

Largest variety in patterns and unsurpassed in  
low prices. New Illustrated Catalogues and Price  
Lists on application.

**CLEVELAND WIRE WORKS.**  
**W. S. TYLER,**  
MANUFACTURER OF  
**STEEL WIRE CLOTH**  
Of Every Description,  
for mining purposes. All meshes from  
2 to the inch up to 100-mesh made and  
carried in stock.

Cleveland, Ohio.

**Bergen Port Spelter.**

MINES: WORKS & FURNACES,  
Lehigh Valley, Pa. Bergen Port, N. J.  
The only Mines and Manufacturers of

**PURE**

**LEHIGH  
SPELTER**

From Lehigh Ore.

Especially adapted for

Cartridge Metal and German Silver.

Also manufacturers of

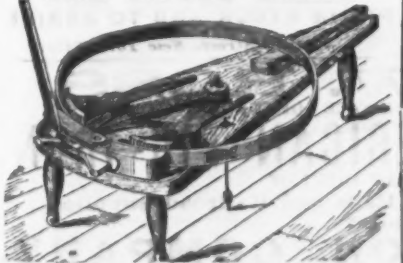
**BERGEN PORT OXIDE ZINC.**

Superior for Liquid Paint on account of its body  
and wearing properties.

**BERGEN PORT ZINC CO.**

E. A. FISHER, Agent, 13 Burling Slip, N. Y.

**THE LITTLE GIANT**



**Wagon Tire Upsetter.**

The Cheapest and Best.

**LITTLE GIANT MFG. CO.**

Send for Circular. Millport, N. Y.

**EMPIRE NUT CO.**

PITTSBURGH, PA.

**Hot Pressed**

**NUTS.**

Small Sizes a Specialty.

**WHITALL, TATUM & CO.,**

NEW YORK, PHILADELPHIA,

MANUFACTURERS OF

**CHEMICAL**

AND OTHER

**GLASSWARE.**

Catalogues sent upon application.

**IRON AND BRASS RIVETS,**  
Studs, Pins, Screws, &c.,  
For Manufacturers of Light Hardware.  
**BLAKE & JOHNSON, Waterbury, Conn.**

**THRESHER TOOTH (Spike)**  
**STEEL**, of superior quality,  
very soft, strong and tough;  
extremely ductile, and will  
bend double upon itself with-  
out breaking. In use by all  
the leading makers. For sam-  
ple and price address **GAUTIER**  
**STEEL DEPARTMENT** of Cam-  
bria Iron Co., Johnstown, Pa.

[No. 34.]

The New York Office of **GAUTIER STEEL DEPARTMENT** has removed to 104  
Reade Street, where all communications intended for said office should be addressed.

CHARLES A. OTIS, President. SAM'L ANDREWS, Vice President. SAM'L A. BAGUE, General Manager.  
THOS. JOPLING, Treasurer. JOHN C. ANDREWS, Secretary.

**THE AMERICAN WIRE COMPANY,**  
DRAWERS OF  
**IRON AND STEEL WIRE** OF EVERY  
DESCRIPTION

**GALVANIZED, TINNED AND COPPERED WIRE.**

High Grade and Fine Quality Wires a Specialty.

**CLEVELAND, OHIO.**

**J. A. EMERICK** **HOWARD EVANS**  
MANUFACTURERS  
**MOLDERS' TOOLS,**  
**FOUNDRY FACING,**  
**MOLDING SAND,**  
**FOUNDRIE SUPPLIES,**  
**J. A. EMERICK & CO.,**  
1056 to 1076 Beach St., PHILADELPHIA.

ESTABLISHED 1837.  
H. S. CHASE, Sec'y.

INCORPORATED 1876.  
G. F. FORD, Treas.

**Waterbury Mfg. Co.,**  
WATERBURY, CONN.

**Brass Goods.**

**RIVERSIDE  
FOUNDRY  
WORKS.** **ROLLING MILL AND MACHINERY**  
CASTINGS, ROLLS,  
**CLEVELAND, OHIO.**  
INGOT MOLDS, ANNEALING POTS,  
HOT BLAST PIPE, &c.

**FOR STEEL REFINERS.**

**WE OFFER AUSTRIAN CHARCOAL HAMMER STEEL,**

In Flat Bars, deliverable in quantities to suit, in bond or duty paid.

Correspondence solicited. Sample Bars on hand.

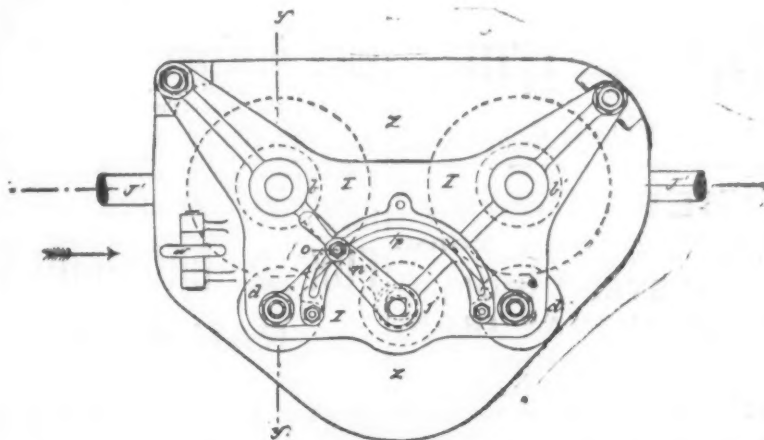
**WOLTMAN & MICKERTS, No. 5 N. Second St., St. Louis, Mo.**

shrouding casting, which delivers it in all  
directions away from the rolls.

The essential details as far as the first hot-  
bed have now been described; the machinery  
in this bed, and for the purpose of transmitting  
the rail over it to the second cambering ma-  
chine, will next be considered. The require-  
ments of this mechanism are twofold: first,  
while the first bed is being used, it must  
entirely disappear from above the surface of  
this bed in order to allow of the free trans-  
verse motion of the hot rails toward the ends  
and from the center of the bed, where they  
are delivered by the cambering machine; second,  
when the second bed is being used,  
the mechanism must appear above the sur-  
face of the first bed in order to grasp and  
forward the rail across said bed to the second  
cambering machine and its bed. This ma-  
chine consists simply of one pair of grip  
rolls, H, Fig. 1, and four sets of guide rolls,  
G, G', similar to those described, with the ad-  
dition of means for raising and lowering  
them above or below the level of the bed.

moved upward, while the rolls G' and G'' are  
moved downward. By pushing the lever in  
the opposite direction, the motion of adjust-  
ment is, of course, reversed. The adjust-  
ment of all the rolls toward the axis of the  
rail is necessary, from the fact that the web  
of all sections of rails runs on the constant  
level of the carrying rolls w, &c., Fig. 3,  
and this level must necessarily be maintained  
through the straightening machine.

In the arms I, I', &c., are formed segmental  
slots, e, through which screw studs pro-  
vided with nuts, e', extend from the frame  
of the machine. When the rolls G—G' have  
been adjusted, the nuts e are screwed down,  
locking them in the desired position, and  
thereby retaining the roll centers as required  
for any given section of rail. Also screw-  
ing down the nuts e relieves the arms I, I',  
&c., and their several connecting links,  
of all strain, their function being simply to  
retain the eccentric bushes in their relative  
positions when the adjustment of the rolls is  
being made.



Rail Cambering Arrangement, Designed by William K. Seaman.—Fig. 6.—Plan of  
Cambering Machine.

according as to which bed is being used.

The action of this pair of grip rolls is  
essentially the same as that of the others;  
its construction is, however, necessarily dif-  
ferent, to allow for the required vertical  
motion, which is provided for as follows:  
The lower bearing of the driven roll-shaft is  
fixed in the plate of the machine. The upper  
bearing of this shaft and the two bearings  
of the adjustable roll-shaft are carried in a  
single casting, which is capable of vertical  
motion, carrying the rolls with it, on four  
fixed guide-posts, in a manner similar to that  
employed for the platen of an ordinary  
hydraulic or screw press. The driven roll-  
shaft obtains its motion by means of a  
"splined" bush, to which the driven gear is  
keyed, through which the shaft can freely  
move in the direction of its axis, but from  
which, by means of a "feather" key, it  
obtains its rotary motion. The casting car-  
rying the three bearings, the rolls and  
attendant parts is supported through links  
at the ends of two levers, which are keyed  
to the horizontal rock-shaft, running in  
fixed bearings on the sole-plate. On the  
opposite ends of these levers are the coun-

There are some very good features also in  
Mr. Seaman's construction of the hot-bed.  
The bed is made unusually high, in order to  
allow a free circulation of the air under-  
neath, thereby obtaining an approximately  
equal cooling effect upward and downward.  
The columns are attached to the bed-plates by  
keys and pins, all of which are fitted into  
cored holes, making a comparatively inex-  
pensive construction.

The rail-straightening machine possesses  
features which, it would seem, might with  
perfect propriety and great advantage be  
adopted for cold straightening. The advan-  
tages claimed for the entire arrangement are:

1. The maintenance of perfect parallelism  
between the axis of the rolls in all conditions  
of adjustment. 2. Dispensing with the  
necessity of different sets of change rolls for  
the various rail sections. 3. The means of  
obtaining a variable camber for different  
rail sections with but the one simple adjust-  
ment of the lever of the bending roll of the  
cambering machine over its graduated arc. 4. In the cambering machine, by the use  
of the continuous upper frame above the

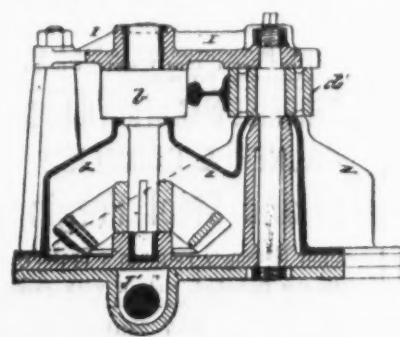


Fig. 7.—Section on Line Y Y of Fig. 3.

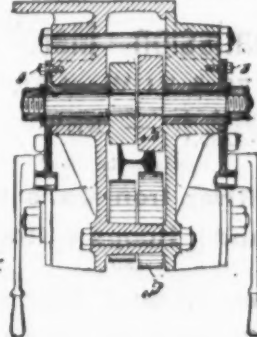


Fig. 8.—Section Through X X of Fig. 7.

terweights, which practically balance the  
weight of the vertically moving parts. To  
raise or lower the pair of grips, it is only  
necessary to operate the lever, and, since  
the parts are balanced, the power necessary  
to do this is only that due to the friction of  
the moving parts.

The several sets of tilling guide rolls and  
the single pair of rising grip rolls are all  
operated by means of a lever, W, Fig. 2,  
attached by links, P, to convenient points on  
the several castings as shown, and worked  
from a point outside the hot-bed. After hav-  
ing passed through the several sets of grip  
and guide rolls, the rail will contain no bends  
in a horizontal plane; if, however, from  
irregular working of the rolling train, any  
kinks have been put in the rail in the verti-  
cal plane, these will still remain in it when  
it reaches the cambering machine. To take  
these kinks out is the function of the straight-  
ening machine, situated at P in the general  
plan, Fig. 1, and which is illustrated by Figs.  
5 and 6, the former of which is a side eleva-  
tion, the latter a vertical section through  
XX, Fig. 5. The machine contains two  
entirely distinct sets of rolls, as shown in  
Fig. 8, each composed of five rolls—one set,  
G, G', G'', G''', G'', acting upon the head of the  
rail, the other upon its flange.

None of the rolls of this machine are  
driven, the grip rolls situated on either side  
of it serving to drive and draw the rail  
through without further aid. Each roll is  
keyed rigidly to its respective shaft; the  
shafts have their bearings in the eccentric  
bushes I, I', &c., which in turn find their sup-  
port in the frame of the machine. It will  
now be seen, upon a moment's consideration,  
that if these eccentric bushes be turned in  
their bearings, the positions of the centers of  
the rolls will be altered relatively to one  
another. From each of the bushes I—I' ex-  
tends an arm, J—J', and from J' extends a  
hand lever, K, which connects with the arms  
J and J' by a rod, L, and with the arm J' by  
a rod, M, the arm J' being connected to the  
arm J by a rod, N. By pushing the  
lever K in the direction indicated, all the  
bushes I—I' are turned in the direction of  
the arrows, and the rolls G, G' and G'' are

rolls, a much more rigid construction than  
has been hitherto obtained. 5. The efficient  
provision for the exclusion of scale from  
bearings and gearing. 6. A rigidly straight  
guide for the moving rail, by making one of  
each pair of rolls run about a fixed center,  
while the opposite adjusts toward it. 7. The  
minimum of necessary labor for operating.  
8. The minimum of necessary driving gear-  
ing and shafting. 9. The provision for tak-  
ing vertical kinks out of the rail by the  
use of the straightening machine. 10. The  
provision of a hot-bed that will remain level  
under the variable temperatures to which it  
is subject.

The plan of numbering the Italian laborers  
on the West Shore road is said to have been  
found highly successful. Finding it impos-  
sible to keep track of the men by their  
names, the contractors concluded to number  
them. The number of each Italian is painted in  
plain figures on the seat of his pantaloons. Be-  
fore beginning work in the morning and at  
noon and again at night, the men are formed  
in line, and the foreman passes in the rear  
of them and takes down each number, in  
order to ascertain who is present, as well as  
who is absent. The plan is beneficial in two  
ways—the men are easily recognized, and  
they are also kept from sitting down too  
much for fear of rubbing out the figures on  
the seats of their pantaloons.

At the instance of the bulk of the iron-  
workers of the North of England, the Board  
of Arbitration issued a decree some time ago  
restricting for six months the output of man-  
ufactured iron by one shift out of eleven per  
week. One condition of this concession on  
the part of the employers was that all works  
in the North should partake in it, or the  
regulation would become void. According  
to present reports, however, the West Marsh  
and Britannia Works, of Middlesbrough,  
were recently lit up for work, the mill hands  
having offered their employers to break the  
rule if paid 2½ per cent. advance in wages.  
The offer was accepted, and it is now thought  
that the action taken will lead to serious dis-  
putes in the trade.



## OGDEN & WALLACE,

85, 87, 89 & 91 Elm St., New York.

## Iron and Steel

Of every description kept in stock.

Agents for Park Brother & Co.'s

## BLACK DIAMOND STEEL.

All sizes of Cast and Machinery Steel constantly on hand.

## PIERSON & CO.,

Established 1790,

24 & 26 Broadway, 77 & 79 New St.

NEW YORK CITY.

## Ulster Iron.

All Sizes and Shapes kept in Stock.

## ABEEL BROS.,

180 SOUTH ST., NEW YORK.

805 WATER ST., NEW YORK.

"ULSTER" IRON,

"CATASAUQUA" IRON,

ALLENTOWN SHAFTING,

COMMON IRON,

And full assortment of sizes of the best brands of

REFINED IRON,

Band, Hoop, Scroll and Angle Iron. Cast, Spring,

Toe-Calk and S. S. Steel.

TELEPHONE CALL, "NASSAU," 379.

A. R. WHITNEY & CO.,

Manufacturers of and Dealers in

## IRON

### AGENCIES:

PORTAGE IRON CO., Limited, Merchant Iron.

HAMBORDE IRON WORKS, Merchant Iron.

NORWAY IRON AND STEEL WORKS, Homo-

geneous Steel Plates.

STATE IRON CO., Tank, Boiler and Girder

Plates.

E. F. NAILS CO., Wire Nails.

BRANDYNE ROLLING MILL, Boiler Plates.

GLASGOW TUBE WORKS, Boiler Flues.

A. M. BYERS & CO., Wrought Iron Pipe.

CARRAGIE BROS. & CO., Limited, Wrought

Iron Beams, Channels and Shapes.

Plans and estimates furnished, and contracts

made for erecting Iron Structures of every descrip-

tion. Books containing cuts of all iron made sent

on application by mail.

Sample pieces at office. Please address

58 Hudson Street, New York.

## BORDEN & LOVELL,

Commission Merchants,

70 & 71 West St.,

NEW YORK.

Agents for the sale of

Fall River Iron Co.'s Nails,

Bands, Hoops & Rods,

AND

Borden Mining Company's

Cumberland Coals.

WILLIAM H. WALLACE & CO.,

IRON MERCHANTS

Cor. Albany & Washington Sts.

NEW YORK CITY.

Wm. H. WALLACE Wm. H. REEFMAN

ORFORD NICKEL AND COPPER COMPANY,

SMELTERS AND REFINERS OF COPPER.

THOS. J. POPE & BRO., Agents, 292 Pearl St., New York.

Copper Ore, Mattes or Bullion purchased. Advances made on consignments for refining and sale.

Smelting and Refining Works at Bergen Point, near New York. Offices, 292 Pearl St., New York.

## PASSAIC ROLLING MILL CO.,

Manufacture and have always in stock

## ROLLED IRON BEAMS,

Channels, Angles, Tees, Merchant Bars, Riveted Work,

Forgings, Eye Bars, &c.

PATERSON, N. J.

Room 45, Astor House, New York.

## CUT NAILS,

Hot Pressed Nuts, Bolts, Washers, &c.

DOVER IRON CO.'S

## BOILER RIVETS,

Boiler Brace Jaws, Socket Bolts, &c.

## FULLER BROTHERS & CO.

189 Greenwich Street, New York.

## Marshall Lefferts & Co.,

90 Beekman St., New York City,

MANUFACTURERS OF

## Galvanized Sheet Iron,

Best Bloom, Best Refined and Common.

Galvanized Wire Telegraph and Fence; Galvanized

Hoop and Band Iron, Galvanized Rod and Bar Iron,

Galvanized Nails, Galvanized Chain, Galvanized Iron

Pipe.

## CORRUGATED SHEET IRON

For Roofing, &c., Galvanized, Plain or Painted

Best Charcoal, Best Refined and Common

## SHEET IRON.

Plate and Tank Iron,

C No. 1, C H No. 1, C H No. 1 Flange, Best Flange,

Best Flange Fire Box, Circles.

ALL DESCRIPTIONS OF

Iron Work Galvanized or Tinned to Order.

Price list and quotations sent upon application.

## ROME MERCHANT IRON MILLS,

ROME, N. Y.,

Manufacturers of the best grade of

Bar Iron, Bands and Fine Hoops.

Scrolls, Ovals, Half Ovals, Half Rounds, Hexagon and

Hexagon Iron. Also from Charcoal Pig a superior

quality of Iron braced J. G. All puddled balls re-

duced by hammer. Orders may be sent to the Mill or

to J. O. CARPENTER, our Agent, at 59 John

Street, New York.

## FOX & DRUMMOND,

RAILWAY

AND

## ROLLING MILL

MATERIAL.

68 WALL STREET,

NEW YORK.

JAMES WILLIAMSON & CO.,

SCOTCH AND AMERICAN

## PIG IRON,

No. 63 Wall St., New York.

## ULSTER IRON WORKS.

90 Broadway, New York.

## Tuckerman, Mulligan & Co

CARMICHAEL & EMMENS

130, 132 & 134 Cedar St., New York, and

Nos. 21, 23, 25 & 7 West Lake St., Chicago, Ill.

DEALERS IN

IRON AND STEEL BOILER PLATE.

Lap-Welded Boiler Tubes, &c., &c.

Agent for The Costello Iron Co. The Laurel Roll-

ing Mills, and Union Tube Works; Wrought Iron

Beams, Angles, Tees, Rivets, &c.

## ENTERPRISE MANUFACTURING CO.

ALKER & CROMLISH.

Iron and Steel Forgings.

Light Machinery Forgings a Specialty.

Estimates furnished, and all work executed

promptly at the most reasonable rates.

Nos. 215 & 217 Main Street,

ALLEGHENY, PA.

## GRAY IRON CASTINGS.

JOHN KEPPELMAN, Reading, Pa.,

Herewith gives notice that he has opened a Job

bing Foundry, and is ready to receive orders for

all kinds of Light Gray Iron Castings; also, for

every description of Machinery. Orders promptly

filled. Please address

JOHN KEPPELMAN, Cor. 4d and Court Sts.,

Reading, Pa.

## OXFORD

IRON AND NAIL CO.,

## Cut Nails

AND

## SPIKES.

J. S. SCRANTON, Sales Agent,

81, 83 and 85 Washington Street,

NEW YORK.

## JOHN W. QUINCY & CO.,

98 William Street, New York.

Anthracite & Charcoal Pig Irons,

Wrought Scrap, Cut Nails, Copper,

Block Tin, Lead, Spelter, Antimony, Nickel, &c.

## HARRISON & GILLOON

IRON AND METAL DEALERS,

558, 450, 562 WATER ST., & 5-7, 344, 346 CHERRY ST.,

NEW YORK.

Have on hand, and offer for sale, the following:

Scotch and American Pig Iron, Wrought, Cast and

Machinery Scrap Iron, Car Wheels, Axles and Heavy

Wrought Iron; also old Copper, Composition, Brass,

Lead, Pewter, Zinc, &c.

## BURDEN'S

## HORSE SHOES.

"Burden Best"

Iron

Boiler Rivets.

The Burden Iron Company

Troy, N. Y.

## ULSTER

AND

## BURDEN'S

H. B. & S. Bar Iron.

Also Best Grades of

American & English Refined Iron.

All sizes and shapes in stock.

## EGLESTON BROS. & CO.,

166 South St., NEW YORK CITY.

267 Front St., NEW YORK CITY.

FRANK L. FROMENT,

112 John St.,

NEW YORK.

## IRON AND STEEL.

AGENT FOR

Pencey Iron Works,

Malden, Mass. in Co.,

Marshall Iron Co.,

Still Water Co., Iron Beams, Hoop & Band Iron.

W. S. MIDDLETON,

Broker in Machinery & Iron

Agent for

FORSTER'S CRUSHER & PULVERIZER,

The best in market.

W. S. MIDDLETON, 52 John St., N. Y.

## B. F. JUDSON,

Importer of and Dealer in

SCOTCH AND AMERICAN

## Pig Iron,

Wrought & Cast Scrap Iron,

OLD METALS.

457 & 459 Water St., NEW YORK.

283 & 285 South St., NEW YORK.

## Manhattan Rolling Mill.

J. LEONARD,

445 to 451 West St., 177 & 179 Bank St.,

NEW YORK,

Manufacturer of

HORSE SHOE IRON,

Toe Calk Steel,

Rods, Ovals, Half Ovals and Flats.

DANIEL F. COONEY,

58 Washington St., N. Y.

BOILER PLATES AND SHEET IRON,

LAP-WELDED BOILER FLUES,

Boiler Rivets, Angle & T Iron, Cut Nails & Spikes.

Agency for Glasgow Iron Co., Jos. L. Bailey & Co.,

Pine Iron Works, Leabson Rolling Mills, Chester

Pine and Tube Co., Albany & Rome Iron and Steel

Co.'s celebrated, Boiler Rivets; Homogeneous Steel

Boiler and Fire-Box Plates.

## W. D. WOOD & CO.'S



PATENT

## Planished Sheet Iron.

Patented March 14th, 1865; April 8th, 1873;

Sept. 9th, 1873; Oct. 6th, 1874; Jan. 11, 1876.

Guaranteed fully equal in all respects to the

IMPORTED RUSSIA IRON,

and at a much less price.

FOR SALE

by all the principal

METAL DEALERS

In the Large Cities throughout

THE UNITED STATES,

And at their Office,

111 Water Street, PITTSBURGH, PA.

## SYRACUSE MALLEABLE

IRON WORKS,

SYRACUSE, N. Y.

Mower and Reaper Castings

and Carriage Irons a

Specialty.

W. B. BURNS, Proprietor.

C. W. LEAVITT, 161 Broadway,

NEW YORK.

NEW AND SECOND-HAND

Rails and Railway Equipment

PIG and BAR IRON, OLD RAILS and SCRAP.

General Agent ALLENTOWN ROLLING MILLS.

Agent for PARDEE CAR & MACH. WORKS.

## KINNEIL

## SCOTCH PIG IRON,

FOR SALE IN LOTS TO SUIT,

EDWARD J. WESSELS

SOLE AGENT FOR THE

UNITED STATES,

17 Cedar St., - - NEW YORK.

F. W. JESUP & CO.,

Railway Supplies and Equipment



**Siemens' Regenerative  
GAS FURNACE.**  
**RICHMOND & POTTS,**  
119 S. Fourth St., PHILADELPHIA, PA.

**HENRY LEVINS & CO.,**  
**Manufacturers' Agents**  
For Iron and Steel Rails, Car Wheels, Boiler and  
Sheet Iron and General Railway  
Equipment.  
Old Rails, Axles, and Wheels bought and sold.  
234 S. 4th St., Philadelphia.

## Cambria Iron and Steel Works.

The Cambria Iron Co.,  
having enjoyed a reputation for more than a  
quarter of a century for fair dealing and excel-  
lence of its manufactures, has now a capacity of  
**150,000 Tons of Iron & Steel Rails**  
And most approved patented  
**Railway Fastenings.**  
Address  
**CAMBRIA IRON COMPANY,**  
233 South Fourth Street, Philadelphia,  
or at Works, Johnstown, Pa.,  
or Lenox Smith, Selling Agent, 45 Pine St.,  
New York.

The Cambria Iron Co.,  
having acquired the entire ownership of the  
**WIRE AND STEEL MILLS**  
Of the GAUTIER STEEL CO., Limited, will con-  
tinue to produce all their specialties, such as Mer-  
chant Steel, Flaw Steel, Wagon and Carriage  
Springs, Rake Teeth and Harrow Teeth, Agricul-  
tural Implement Steel and  
**ALL KINDS OF WIRE,**  
Well-known for superior quality of material and  
excellence of workmanship.  
Address  
**GAUTIER STEEL DEPARTMENT,**  
PHILIP E. CHAPIN, Gen'l Sup't, Johnstown,  
New York Warehouse, 104 Rade St.  
Philadelphia Warehouse, 533 Arch St.

**THE PHOENIX IRON CO.,**  
410 Walnut Street, PHILADELPHIA.  
Manufacturers of Wrought Iron

**Beams, Deck Beams, Channels, Angle & Tee Bars,**  
**STRAIGHT AND CURVED TO TEMPLATE,**  
Largely used in the construction of Iron Vessels, Buildings and Bridges.  
**WROUGHT IRON ROOF TRUSSES, CIRDERS & JOISTS,**  
and all kinds of Iron Framing used in the construction of Fire Proof Buildings.  
**PATENT WROUGHT IRON COLUMNS, WELDLESS EYE BARS,**  
and built up shapes for Iron Bridges.  
**REFINED BAR, SHAPING, and every variety of SHAPE IRON made to order.**  
Plans and Specifications furnished. Address  
**DAVID REEVES, President.**  
NEW YORK AGENTS, MILLIKEN & SMITH, 93 Liberty Street.  
BOSTON AGENTS, FRED. A. HOULETTE & CO., 19 Battery March St.

**ALAN WOOD & CO.,**  
MANUFACTURERS OF  
Patent Planished, Galvanized, Common, Best Refined, Cleaned and Charcoal Bloom  
**PLATE & SHEET IRON.**  
No. 519 Arch St., Philadelphia, Pa.  
Orders solicited especially for Corrugated, Gasholder, Pan and Rib, Water Pipe, Smoke Stack,  
Tank and Boat Iron; Last, Stamping, Ferrule, Locomotive Headlight and Jacket Iron.

**NAILS**  
**JAS. ROWLAND & CO.,**  
Kensington Iron, Steel & Nail Works,  
930 North Delaware Ave., - PHILADELPHIA,  
Manufacturers of the  
**ANVIL BRAND REFINED MERCHANT BAR IRON.**  
Also, the James Rowland & Co. Kensington ★ Nails, cut from  
their Refined Anvil stock. Also, Flaw and Cultivator Steel (Skeg)  
Iron a specialty; also Rounds, Squares, Flats, Bands and Hoop  
Iron.

**PENCOYD IRON WORKS.**  
**A. & P. ROBERTS & CO.,**  
MANUFACTURERS OF  
**BEAMS, CHANNELS, DECK BEAMS,**  
**ANGLES, TEES, PLATES, MERCHANT BAR.**

**SHAFTING AND ROLLED OR HAMMERED AXLES OF IRON OR STEEL.**  
Office, No. 26 S. Fourth St., Philadelphia. Agents for the sale of Glamorgan Pig Iron.

**J. W. PAXSON & CO.,**  
DEALERS IN  
**MOULDING SAND,**  
1021 North Delaware Avenue, PHILADELPHIA, PA.,

**MANUFACTURERS**  
**X MINERAL, CHARCOAL FACING, LEAD FACING,**  
**XX MINERAL, ANTHRACITE FACING, RIDDLES, SHOVELS,**  
**IXL FACING, SOAPSTONE, STEEL BRUSHES.**

**ALLENTOWN ROLLING MILL COMPANY,**  
Manufacturers of  
Rails, Bars, Axles, Shafting, Fish Bars (Plain and Angle), Spikes,  
Rivets, Bolts and Nuts, &c. Bridges and Turn Tables.  
General Office, 237 South Third St., Philadelphia. Works at Allentown, Pa.  
JAMES C. BOOTH THOMAS H. GARRETT ANDREW A. BLAIR

**BOOTH, CARRETT & BLAIR,**  
**Analytical and Consulting Chemists,**  
919 and 921 Chant St. (10th St. above Chestnut St.), PHILADELPHIA PA.  
Established in 1836.  
Analyses of Ores, Waters, Metals and Alloys of all kinds. A special department for the  
**ANALYSIS OF IRON AND STEEL,**  
Fitted with all the apparatus and appliances for the rapid and accurate analysis of Iron Steel, Iron  
Ores, Slags, Limestones, Coals, Clays, Fire Sands &c. Agents for sampling ores in New York and  
Baltimore. Price lists on application.

**SHENANDOAH IRON, LUMBER, MINING & MFG. CO.,**  
MANUFACTURERS OF  
**SUPERIOR COKE PIG IRON**  
FROM NEUTRAL HEMATITE ORES. Also  
CHARCOAL PIG IRON AND BLOOMS FROM SAME ORES.  
Works at MILNES, PAGE CO., VA. Treasurer's Office, 121 WALNUT ST., PHILADELPHIA.  
JUSTICE COX, JR. & CO., Sales Agents, 224 South 4th St., Philadelphia.

**Edward J. Etting,**  
IRON BROKER AND COMMISSION MERCHANT,  
229 S. Third St., Philadelphia, Pa.  
**Pig, Bar and Railroad Iron.**  
OLD RAILS, SCRAP, &c.  
Agent for the  
**MOUNT SAVAGE FIRE BRICK,**  
The Allentown Iron Co. and the  
Greenwood Rolling Mill.  
STORAGE WHARF AND YARD  
DELAWARE AVENUE ABOVE CALLOWELL STREET,  
connected by track with railroad.  
Cash advances made on Iron.

Established 1837.  
**A. PURVES & SON,**  
Dealers in  
Scrap Iron, Metals and Machinery,  
Cor. South and Penn Sts., Philadelphia.  
Offer for sale, in lots to suit, Red or Yellow Heavy  
Scrap Brass; Ingot Brass, best qualities, Ingot Gun  
Metal made strictly from Old Cannon; Steam Pumps,  
Shafting Pulleys, &c. Machinery and Tools various  
descriptions. Cash paid for Scrap Iron and Metals.  
ISAAC V. LLOYD. JAS. G. LINDSAY.  
**LLOYD & LINDSAY,**  
No. 336 Walnut St., PHILADELPHIA.  
Brokers and General Dealers in  
Iron and Steel, Railway Equipments and  
Supplies, Bar, Plate and Sheet Iron, Pig  
Iron, Rails and Fastenings, Muck Bars,  
Blooms, Boiler Tubes, Wrought Iron Pipe, &c.  
Old Rails and Scrap Iron.  
Florida Yellow Pine, cargo lots.

**J. O. RICHARDSON,**  
No. 232 Dock St., Philadelphia,  
DEALER IN  
**Pig Iron, Merchant Bar Iron**  
**and Iron Ores.**

**J. J. MOHR,**  
Sole Agent for  
Sheridan, Leesport, Temple,  
Millcreek and Mt. Laurel  
**BESSEMER, FOUNDRY AND FORGE**  
**PIG IRON,**  
**CHARCOAL PIG IRON.**  
430 Walnut St., PHILADELPHIA, PA.  
G. A. HENNINGTON. S. FRANK SHARPLESS.  
**HEBERTON & CO.,**  
Selling Agents and Commission Merchants  
For the sale of  
Pig, Bloom, Plate, Bar, Scrap, Galvanized,  
Black, Sheet, Pipe and Railroad  
**IRON.**  
No. 220 So. 3d St., Phila.  
Charcoal Bloom and Pig a specialty.

Langhorne Wister. Rodman Wister. J. N. M. Shimer.  
Late Shimer & Co.  
**L. & R. WISTER & CO.,**  
**IRON BROKERS.**  
Scrap Iron a Specialty.  
Agents for the Clearfield Fire Brick Co.'s  
Fire Bricks.  
No. 930 South 4th St., Philadelphia.

**WM. MCFARLAND**  
**Iron and Brass Founder,**  
**TRENTON, N. J.**  
Chilled Cast Wire Dies a Specialty  
Any size or style made at short notice.

**MORRIS, WHEELER & CO.,**  
**IRON, STEEL & NAILS.**  
WAREHOUSE AND OFFICES, 10th & Market Sts., 400 Chestnut St.,  
PHILA., PA. PHILA., PA.  
New York Address, 14 CLIFF ST.

**WIRE RODS, Steel and Iron,**  
English Make.  
Superior Value. F. O. B. Liverpool.  
Particulars from  
**A. C. LESLIE & CO.,**  
MONTREAL.

**CUMBERLAND NAIL AND IRON CO.,**  
MANUFACTURERS OF  
**"Cumberland" Nails and Wrought Iron Pipe,**  
43 North Water Street and 44 North Delaware Avenue, PHILADELPHIA.

**J. TATNALL LEA & CO.,**  
Successors to CABEN & CO.,  
**IRON COMMISSION MERCHANTS,**  
No. 400 Chestnut Street, Philadelphia.  
BESSEMER, MILL AND FOUNDRY PIG IRON, SKELETON IRON, MUCK AND SCRAP BARS NATIVE  
AND FOREIGN ORES, A. A. HUTCHINSON & BRO.'S CONNELLSVILLE COKE.

**GROOME, ROBERTS & CO.,**  
(FORMERLY OF J. F. BAILEY & CO.),  
**IRON AND STEEL COMMISSION,**  
216 South Fourth Street, PHILADELPHIA.

**Beams, Channels, Angles, Sheared and Universal Plates, Car Axles, &c.**  
**BRIDGE SPECIFICATIONS A SPECIALTY.**

**CHAINS.** **BRADLEE & CO., EMPIRE CHAIN WORKS,**  
816 Richmond St., Philadelphia.  
Special attention given to the Manufacture of Chains for  
Cranes, Mining and Dredging Chains; "D. B. Q." Special  
Crane Chain.

JUSTICE COX, JR. CHARLES E. BARNES.  
**JUSTICE COX, JR., & CO.,**  
AGENTS FOR  
CHICKIES, CONEWAGO, MONTGOMERY AND  
SHENANDOAH  
**Foundry & Forge Pig Iron.**  
CARBON ROLLING MILL CO., Limited,  
Best Quality Muck Bar.  
**CATASAUQUA MFG. CO.'S**  
**Bar, Angle, Skelp and Sheet Iron.**  
Shenandoah (Va.) Best Charcoal Blooms.  
No. 224 So. Fourth St., PHILADELPHIA.

**BLAKEY & WALBAUM,**  
206 S. Fourth St., PHILADELPHIA,  
55 & 57 Pine Street, New York.  
GENERAL MERCHANDISE BROKERS.  
SPECIALTIES,  
**NEW AND OLD RAILS,**  
**BLOOMS, BESSEMER PIG,**  
**Spiegeleisen Iron Ores**  
**AND RAILROAD SUPPLIES GENERALLY.**  
Sole Agents for the United States for  
The North Lonsdale Iron and Steel  
Co., Limited.  
Bessemer Pig Iron, brand "ULVERSTON."  
Malleable Pig Iron, brand "U. H. M."  
N. B. ALLEN & CO.'S DINAS FIRE BRICKS.

**JEROME KEELEY & CO.,**  
306 Walnut Place, Philadelphia.  
SELLING AGENTS FOR  
CHARCOAL AND ANTHRACITE BLOOMS, PIG IRON,  
BAR IRON, SHEET IRON, STEEL AND IRON RAILS,  
IRON CLAD STEEL RAILS AND BARS, MAGNETIC  
AND HEMATITE IRON ORES, FIRE BRICK, COAL  
AND JOKE, MUCK BARS, Handle Old Iron and Steel  
Rails, Scrap Iron &c. Examine and negotiate sales  
of Iron and Coal properties.  
E. H. Wilson. A. Kaiser. J. B. M. Hiron.  
**E. H. WILSON & CO.,**  
230 South Third Street, Philadelphia.  
BROKERS AND DEALERS IN  
**IRON AND STEEL.**  
Correspondence solicited.

**THE  
STANDARD  
STEEL  
WORKS.**  
**LOCOMOTIVE AND CAR WHEEL VIRE.**  
Manufactured from the celebrated OTIE STEEL  
BRAND  
**STANDARD.**  
Quality and efficiency fully guaranteed. Prices as  
low as any of the same quality. We manufacture  
Heavy and Light Forgings, Driving and Car Axles,  
Cranks Pins, Piston Rods, &c.  
Works at Leavittown, Pa.  
Office, 220 S. 4th St., Philadelphia, Pa.  
**J. W. HOFFMAN & CO.,**  
Iron Merchants & Railway Equipments.  
308 South Fourth St., Philadelphia.  
Sole agents Glasgow Iron Co. and Pine Iron Works  
manufacturers of Muck Bar and all grades of Plate  
Iron, Celebrated "42lingow" and "44lingow"  
brands for fire boxes and difficult flanging. Pig and  
Bar Iron, Rails and all shapes in Iron. Quotations  
given on Bridge and Building Specifications.

**ETHELBERT WATTS,**  
**IRON BROKER AND COMMIS-**  
**SION MERCHANT,**  
No. 396 Walnut St., Philadelphia.  
Pig, Muck and Bar Iron, Scrap, Etc.  
Also, COKE, IRON ORES, BIT. COAL.

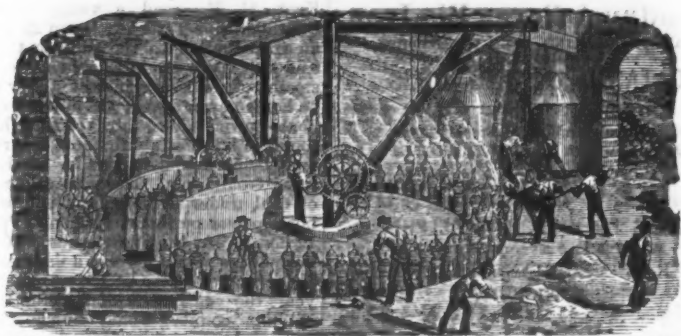
**ANDOVER PIG IRON,**  
FOR BEST MILL PRODUCTS.  
Andover Chill Iron for Carwheels, &c.  
Each pig marked exact chill depth (1/4 inch to 3/4  
inch). A. Whitner & Son's standard test.  
F. A. COMLY, TREAS. J. WENLEY FULLMAN, Agent.  
407 Walnut St., PHILADELPHIA.

**Some Points About Boilers.**  
At the regular monthly meeting of the En-  
gineers' Society of Western Pennsylvania,  
held at Pittsburgh on the 17th ult., William  
Kent, M. E., read a valuable paper on  
"Evaporative Tests of Steam Boilers." As  
an introduction to the subject, the speaker  
said that there are in Allegheny County 1500  
steam boilers, averaging, at a low estimate,  
50 horse-power each, or a total of 75,000  
horse-power. Two-thirds of these boilers are  
found in large establishments, the remaining  
ones being found in smaller establishments  
using from 1 to 3. The average consumption  
of coal under these boilers is 6 pounds per  
horse-power per hour, or 1 bushel per day of  
12 hours. At the average cost of 6 cents per  
bushel this would involve a daily expense of  
\$4500; or, if there be 300 working days per  
year, the yearly cost of fuel for the boilers  
of the county would be no less than  
\$1,500,000. Of this sum at least one-half, or  
\$675,000, is wasted on account of the lack of  
attention to the simplest laws of steam engi-  
neering. Fully 20 to 30 per cent. is wasted  
on account of the continuance in use of what  
the speaker characterized as "that venerable  
relic of the days of the stage coach," the  
two-flued boiler, and to the overdriving of  
the same. The remainder of the loss is due  
to imperfect combustion, radiation and es-  
cape of heat through the chimney, to the  
use of antiquated engines and engines not  
properly proportioned to their work, and to  
friction and condensation in long lines of  
steam pipes. The two-flued boiler occupies a  
large amount of space, and to economize the  
latter the boilers are usually driven to twice  
their normal capacity. This necessarily en-  
tails the very great waste of fuel mentioned.  
One pound of pure carbon, thoroughly  
burned, gives off 14,500 heat-units, which is  
sufficient, supposing absolute freedom from  
waste by radiation, &c., to evaporate 15  
pounds of water at 212° into steam at the  
pressure of the atmosphere, or 12.55 pounds  
from 60° to steam at 100 pounds pressure.  
Good coal contains about 90 per cent. of pure  
carbon, the remaining 10 per cent. being  
ash and moisture; hence, 1 pound of good  
coal should evaporate 13 1/2 pounds of water  
into steam at the same temperature, or 11.3  
pounds from 60° to steam at 100 pounds  
pressure. The losses from radiation, imper-  
fect combustion, excessive heat of chimney  
gases, &c., rarely aggregate less than 25 per  
cent., so that the actual evaporation is 10  
pounds of water from and at 212°, or 8.47  
pounds from 60° to steam at 100 pounds  
pressure.  
Mr. Kent stated that with precisely simi-  
lar boilers, all clean and in good condition,  
but having different furnace settings, and  
using different qualities of coal, he had made  
evaporative tests giving results all the way  
from 10.4 pounds of water per pound of  
coal down to 4 pounds. The former result  
was obtained with good Pittsburgh coal con-  
taining 9 per cent. of refuse, and the latter  
with Illinois coal containing over 20 per cent.  
The boiler in the latter test had been altered  
by the engineer in charge, who declared it  
to be much better than before. (1) It turned  
the coals much too rapidly, producing an  
enormous amount of clinker. With slower  
combustion the same coal gave much better  
results. The speaker related a test made by  
him at Pittsburgh on two sets of boilers,  
one a set of Babcock & Wilcox boilers, rated  
at 416 horse-power, and giving out 522 horse-  
power, while the other was a battery of eight  
two-flued boilers, rated at 320 horse-power,  
but furnishing 741 horse-power. The condi-  
tions were made as nearly alike as possible  
without interfering with the regular work-  
ing of the mill. The coal was from the Castle  
Shannon mines, a mixture of screened lump  
and nut, free-burning, with 11 per cent. of  
ash and but little clinker. The first test  
lasted from Monday morning until Saturday  
evening, and the second from the following  
Monday morning until Wednesday evening.  
The result was 9,709 pounds of water from  
and at 212° per pound of coal in the former,  
and in the latter 6,334 pounds of water from  
and at 212° per pound of coal, making the  
result 34.76 per cent. in favor of the water-  
tube boilers. The pyrometer showed the  
gases in the chimney during the first experi-  
ment to vary in temperature from 420° to  
460°, and in the latter from 830° to 1000°,  
fully confirming the results of the tests. The  
mill where the tests were made runs on an  
average 300 days of 20 hours each yearly,  
or 6000 working hours. With coal at 6 cents  
per bushel, the annual loss from the 34.76  
per cent. waste would amount to \$7278. The  
1000 boilers of this type in the county prob-  
ably waste as much as the coal-burning  
heating furnaces, which were some time ago  
shown by Mr. Wm. Metcalf, C. E., to waste  
annually \$995,727.85, which would be saved  
by the adoption of the regenerative system.  
The term "horse-power" of a boiler is not  
strictly logical, as a horse-power is a term  
representing a certain amount of dynamic  
energy; but as some term of comparison  
is necessary between an engine and its boiler,  
the evaporation of 30 pounds of water at  
212° into steam at 70 pounds pressure has  
been adopted as a standard, being about  
the amount of work required of a boiler to  
develop one indicated horse-power in a good  
non-condensing engine. A heating surface  
of 10 square feet in a flue boiler, and  
15 square feet in a tubular boiler, is re-  
quired to develop a horse-power with fair  
economy. In making a test the feed-water  
should be passed through a meter, which  
may be attached during the dinner hour,  
and should be previously tested. An exact  
record of the amount of coal delivered to  
the boilers should be kept at the weigh-  
house. The pressure should be recorded at  
regular intervals. The temperature of the  
feed-water should be carefully noted. The  
quantity of ashes produced should be re-  
corded, and an analysis of the coal is desir-  
able. Dividing the number of pounds of  
feed-water delivered by the weight of coal  
consumed will give the evaporation per  
pound of coal under actual conditions, which  
can readily be reduced to 212° by a simple  
calculation. Should the result be from 8 to  
10, it may be regarded as satisfactory; but  
if it be from 5 to 7, the boilers are not work-  
ing economically. The amount of water  
entrained in the steam, or the amount of  
priming, should also be determined, but this  
is rather difficult and requires very delicate  
instruments. The priming test consists



## A. H. McNEAL, BURLINGTON, N. J.

Flange Pipes.



General Foundry Work.

### CAST IRON PIPES FOR WATER AND GAS.

ESTABLISHED IN 1848.

## SINGER, NIMICK & CO., Limited, PITTSBURGH, PA.,

MANUFACTURERS OF ALL KINDS OF

HAMMERED AND ROLLED

## STEEL.

Warranted Equal to any Produced.

### BEST REFINED TOOL CAST STEEL

For Edge and Turning Tools, Taps, Dies, Drills, Punches, Shear-Knives, Cold-Chisels and Machinists' Tools generally.

### SAW PLATES

For Circular, Mulay, Mill, Gang, Drag, Pit and Cross-Cut Saws.

### Sheet Steel

For Springs, Billet Web and Hand Saws, Shovels, Cotton Gin Saws, Stamping Cold, &c., &c.

### SIEMENS-MARTIN (Open-Hearth) PLATE STEEL

For Boilers, Fire-Boxes, Smoke-Stacks, Tanks, &c.

All our Plate and Sheet Steel being rolled by a Patented Improvement, is unequalled for surface finish and exactness of gauge.

### ROUND MACHINERY CAST STEEL

For Shafting, Spindles, Rollers, &c., &c.

File, Fork, Hoe, Rake, R. R. Frog, Toe-Link, Sleigh-Shoe and Tire Steel, &c.; Cast and German Spring and Plow Steel.

"Iron Center" Cast Plow Steel.  
"Soft Steel Center" Cast Plow Steel.  
"Solid Soft Center" Cast Plow Steel.

Finished Rolling Plow Counters, with Patent Screw Hubs  
Agricultural Steel cut to any pattern desired. (attached).  
Steel Forgings made to order.

Represented at 59 Beekman St., New York, and 417 Commerce St., Philadelphia, by  
HOGAN & SON, General Agents for Eastern and New England States.

## THE MIDVALE STEEL COMPANY, CRUCIBLE AND OPEN-HEARTH STEEL.

## TIRES and AXLES OF EVERY DESCRIPTION.



Tool, Machinery and Spring Steel  
Castings and Forgings.

Works and Office,

Niagara, Philadelphia, Pa.

Warehouse,

12 N. 5th St., Philadelphia, Pa.

### PHILADELPHIA STEEL FORGE.



"Anvil" Brand Best Refined  
TOOL CAST STEEL

THE PHILADELPHIA STEEL FORGE, Office, Frankford, Philadelphia, Pa.

Agents:  
HENRY G. NICHOLS, 14 Platt St., N. Y. City. THE SOUTHERN RAILWAY SUPPLY CO., 15 So. 14th St., Richmond, Va.  
General Western Agents, CHAS. I. WICKERSHAM & CO., No. 232 Lake St., Chicago.

ESTABLISHED 1847.

## A. WHITNEY & SONS, PHILADELPHIA,

### CHILLED RAILROAD WHEELS

For every kind of service, including Street, Mine and Lumber Tramways. Wheels furnished in rough bored or on axles. Chilled castings made to order.

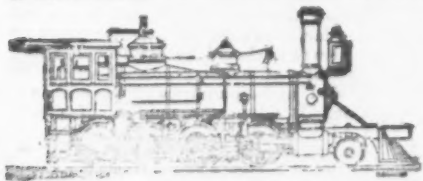
## PENNSYLVANIA STEEL COMPANY, Steel Rails, Frogs, Crossings & Switches.

Forgings for Piston Rods, Guide Bars, Wrist Pins and Machinery Purposes.

Works at Baldwin Station, Pennsylvania Railroad, near Harrisburg, Pa.

Address orders to

PENNSYLVANIA STEEL COMPANY, 208 South Fourth Street, Philadelphia.



### BALDWIN LOCOMOTIVE WORKS,

BURNHAM, PARRY, WILLIAMS & CO., Proprietors,  
Philadelphia, Pa., U. S. A.

Manufacturers of  
LOCOMOTIVE ENGINES  
of every Description.

Catalogues, photographs and estimates furnished on application of customers.

NOISELESS STEAM MOTORS,  
For city and suburban Railways.

These machines are nearly noiseless in operation; show no smoke with the use of anthracite coal or coke as fuel, and show no steam whatever under ordinary conditions of service. They can be run at two or three times the speed of horse-cars and draw additional cars. Circulars with full particulars supplied.

## ROANE IRON COMPANY, Pig and Railroad Iron. CHATTANOOGA, - - - - - TENN.

L. HERNSHEIM,  
Manufacturers' Agent and Commission Merchant,  
No. 20 Nassau St., NEW YORK.  
STEEL RAILS, BLOOMS AND WIRE RODS,  
Bessemer, Scotch and Charcoal Pig Iron,  
FERROMANGANESE, SPIEGEL IRON, SCRAP IRON, &c., &c.

BRITTON IRON AND STEEL CO.,  
MANUFACTURERS OF  
IRON AND STEEL BOILER PLATE,  
Tank, Bridge and Ship Plates,  
BLACK AND GALVANIZED SHEET IRON.  
Works foot of Wason St., cor. L. S. & M. S. R. R., CLEVELAND, O.

JACKSON IRON COMPANY,  
Manufacturers of  
Fayette Pig Iron (L. S. Charcoal),  
Stewart Pig Iron (Bessemer Coal and Coke),  
Especially adapted for Bessemer, Siemens-Martin  
Malleable and Car Wheel purposes.  
Also, Hammered Blooms, Billets and Muck Bar, extra low in phosphorus, for Siemens-Martin and  
Crucible Steel. Miners of Jackson (Lake Superior) Iron Ores.  
FAYETTE BROWN, Gen. Agent. HARVEY H. BROWN, Asst. Gen. Agent. Offices, 130 Water St.

HARVEY H. BROWN & CO.,  
AGENTS  
CHAMPION IRON CO., } Lake Superior Iron Ores.  
LAKE SUPERIOR IRON CO. }  
Dealers in Pig Iron, Iron Ores and Old Rails.  
Grand Arcade Building, 101 St. Clair St., CLEVELAND, OHIO.  
CHARLES RIDGELY, President. JOHN W. BUNK, Vice-President.  
Geo. M. BRINKERHOFF, Secretary. WM. BARRETT RIDGELY, Assistant Secretary.

## SPRINGFIELD IRON CO.,

MANUFACTURERS OF

## IRON AND OPEN-HEARTH STEEL,

Ingot, Blooms, Billets, Boiler Plate, Spring, Tire, Machinery and  
Agricultural Steels of all Shapes and Sizes.

WORKS AND GENERAL OFFICES:

### SPRINGFIELD, ILL.

Chicago Office: 111 DEARBORN ST. New York Office: 30 PINE ST.

## CHARLES HUBBARD, 46 Cliff St., New York City, HEAVY STEEL AND IRON FORGINGS,

For Marine and Stationary Engines.

Homogeneous Steel Boiler Plate, "Nashua" Brand.  
Best YORKSHIRE BAR, "TAYLOR" IRON, for Stamped Work, Screws, etc., etc.  
MUSKET SPECIAL TOOL STEEL, requires neither tempering nor hardening.  
Estimates given.

ESTABLISHED 1861.

## Jersey City Steel Works.

JAS. R. THOMPSON & CO.,

Manufacturers of all descriptions of

## STEEL.

Warehouse, 93 John Street, New York.

THOS. C. BURROWS, AGENT.

## MALLEABLE IRON CASTINGS TO ORDER.

Air Furnace Process. Quality Guaranteed. Send for Estimate.

SPECIALTIES IN SADDLERY and WAGON HARDWARE,  
YOUNGSTOWN MALLEABLE IRON COMPANY, YOUNGSTOWN, Ohio.

## BIRMINGHAM ROLLING MILL CO.,

MANUFACTURERS OF

## BAR, BAND AND HOOP IRON, T-RAILS AND SPLICE BARS.

Also, Street and Tram Rails.

Birmingham, Alabama.

Head Office, Louisville, Ky.

We solicit inquiries for Bar Iron and small Rails. Orders filled promptly.

## CALUMET IRON & STEEL CO.,

MANUFACTURERS OF

## OPEN HEARTH STEEL, PIG METAL, MERCHANT BAR, IRON AND NAILS,

SIEMENS OPEN HEARTH STEEL CASTINGS FOR  
RAILROAD, MACHINERY AND AGRICULTURAL PURPOSES.

Offices, First National Bank Building, Chicago, Ill.

C. C. CUMMINGS, President.  
D. C. BRADLEY, Vice Pres. and Gen'l Mgr.  
J. E. BROWN, Sec'y & Treas.

Works at Cummings,

Cook County, Ill.



### IRON ORE PAINT COMPANY,

Manufacturers of

PURE IRON ORE PAINTS,

Red (Rosette) Purple and Brown.

We guarantee all our Paints, and respectfully solicit the patronage of consumers and dealers. Send for Price List.

Office, 134 Merwin St., Cleveland, O.

### J. E. QUACKENBUSH & SON

MANUFACTURERS OF

Porcelain, Mineral & Jet Knobs & Escutcheons.

Send for Price List and Terms.

535 8th Ave., N. Y.

## BEST IRON PAINT.



## CHAS. G. LUNDELL,

No. 7 Exchange Place,

BOSTON,

Mass.

Representing

Ekman & Co.,

COTHENBURG,

SWEDEN.

## WROUGHT IRON

## Boiler Tubes,

Steam, Gas and Water Pipe.

Oil Well Tubing, Casing and

## LINE PIPE.

Cotton Presses, Forgings,

## ROLLING MILL AND

## General Machinery.

## READING IRON WORKS,

261 S. Fourth St. Philadelphia.

## U. S. PATENT FOR SALE

Of a new Bracket for Shafting, successfully introduced in England, under the title of

## THE "SHAFT CARRIER."

First offered in November, 1881, it has already been adopted by many eminent firms. Numerous testimonials, repeated orders and an increasing sale prove its superiority.

Sales in the Year 1882 Exceed \$5000.



It can be fixed to any position (see cut); is self-lubricating and self-adjusting; position of bearing variable both vertically and horizontally; easily fixed true; causes least possible friction; wears almost nil; is cheap; usually supplied from stock.

A MODEL AT THE AMERICAN INSTITUTE, NEW YORK.

For prices and further particulars apply to

TAYLOR & CHALLEN, Engineers,  
BIRMINGHAM, ENGLAND.

## Pentz Patent REIN HOLDER.

Cheap, Useful and  
Ornamental.

SELLS AT SIGHT.

Write for Price List  
and Circular.

### PENTZ

Rein Holder Co.,  
Canton, O.

Also manufacturers  
Patent Sheet-Iron  
Roofing, Iron Ore  
Paint and Davis  
Rock Drill  
Machines.



## BASE BALLS, BATS,

AND  
UNIFORM MANUFACTURERS.

League and Association Balls, and all Outfits.

Fishing Tackle, Tents, Gymnasium Goods,

Canoes, Saddle Bags, and Legging Makers.

106 Main Street, CINCINNATI, OHIO.

B. KITTREDGE & CO.



## COOK & WILSON,

BRASS, BRONZE, SPECTER AND

GERMAN SILVER CASTINGS.

METAL PATTERN MAKING A SPECIALTY.

504 West Street, NEW YORK.

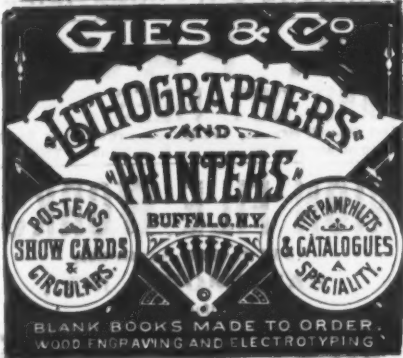


## SILVER & DEMING MFG. CO.,



MANUFACTURERS OF  
Cistern, Pitcher, Well  
and Force Pumps,  
Wind Mill Pumps,  
HAND AND POWER  
ROTARY PUMPS,  
Hydraulic Rams,  
BOILER FEED PUMPS,  
Garden Engines, &c.  
Also, Carriage Makers' Tools,  
Blacksmiths' Drills, Butchers'  
Tools, and Feed Cutters.

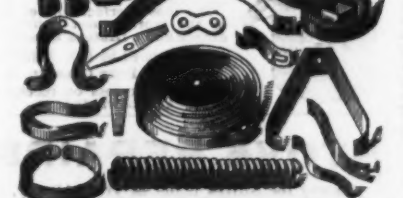
Write for Catalogue and Prices.  
SILVER & DEMING MFG. CO.,  
SALEM, OHIO, U. S. A.



**GIES & CO.**  
LITHOGRAPHERS  
AND  
PRINTERS  
BUFFALO, N. Y.  
POSTERS, SHOW CARDS, CIRCULARS, & CATALOGUES  
SPECIALTY.  
BLANK BOOKS MADE TO ORDER.  
WOOD ENGRAVING AND ELECTROTYPING.



Full size of Band for Brass and Tinned Wire Cages.



**DUNBAR BROS.,**  
Manufacturers of  
Clock Springs and Small Springs  
of every description, from best Cast Steel.  
BRISTOL, CONN.

**Schenectady Molding Sand Co.**

ALBANY AND SCHENECTADY  
MOLDING SAND  
delivered on cars or boats at low rates. All grades  
guaranteed. All orders will receive prompt atten-  
tion. Address, J. G. GREENE, Sec.,  
G. S. VEEDER, Pres.; J. G. GREENE, Sec. and Treas.  
22 Wall St., SCHENECTADY, N. Y.

**CLOTHES WRINGERS.**



**T. J. ALEXANDER, Manager,**  
BOSTON, MASS.

**WILLIAMSPORT SAW WORKS.**  
SELF-STRAINING.  
BEST AND CHEAPEST.



**E. ANDREWS & SONS,**  
WILLIAMSPORT, PA.  
Warranted to give Satisfaction.

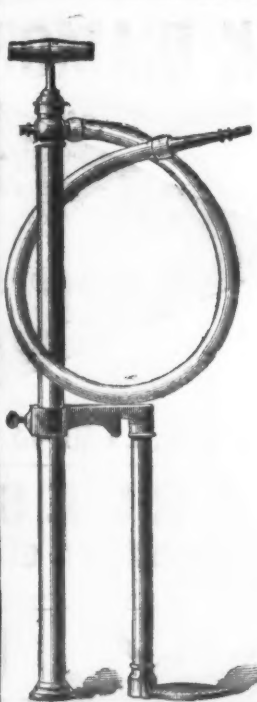


**CHAMPION  
WASHING  
MACHINE.**  
Agents wanted in every  
County; the best, cheap-  
est, and the best selling  
washer ever invented.  
It occupies no more room  
than a wringer; is strong,  
durable, simple and is  
easily operated, and  
saves over half the time  
and labor in washing.  
Send for a price list. Large  
discount to the Trade  
and Agents. **SEAMAN & CO.,** Millport, N. Y.

**HAMMER HANDLES.**

Hammer and Hatchet Handles for  
Tool Makers.

**S. MUSSELMAN & SON,**  
QUAKERTOWN, PA., U. S. A.



The above cuts (Fig. 250) represent our **PATENT AQUAPULT**, so valuable a Hand Force Pump that certain competitors have made bold to infringe on same, and even to resort to the crime of plagiarism in using our cuts and trade-mark name of article to decoy customers away from our manufacture and invention; and we caution the trade and customers against purchasing this article when not made by ourselves, as we intend to protect our rights under our patent.

**WE ARE THE ORIGINAL AND FIRST INVENTORS OF THIS STYLE OF PUMP, AND HOLD VALID LETTERS PATENT ON SAME, AND ANY STATEMENT THAT IT HAD BEEN IN THE MARKET PREVIOUS TO OUR MANUFACTURE OF SAME IS OF COURSE ABSURD AND WITHOUT THE SLIGHTEST FOUNDATION IN TRUTH.**

**W. & B. DOUGLAS, Middletown, Conn.**  
BRANCH WAREHOUSES:  
85 and 87 JOHN STREET, NEW YORK, and 197 LAKE STREET, CHICAGO, ILL.

## UNION MANUFACTURING CO.



**FIG. 114 REPRESENTS OUR  
Hand Force Pump.**  
It is made of brass, is strong and light, and is the best pump of its kind in the market. Write for prices.

**UNION MANUFACTURING CO.,**  
Warehouse, 96 Chambers St., New York. NEW BRITAIN, CONN.

## OLD DOMINION CUT NAILS, BAR IRON.

Address **R. E. BLANKENSHIP,**  
RICHMOND, VA.  
GEORGE BROOKE, President. OEO. W. HARRISON, Treasurer.

**THE E. & G. BROOKE IRON CO.,**  
Birdsboro, Berks Co., Pa.,  
Manufacturers of

**ANCHOR BRAND  
NAILS AND SPIKES.**  
Capacity 1000 Kegs per Day.  
Made from their own Pig Iron, insuring regularity and superiority in quality.

Also, **FOUNDRY AND FORGE  
PIG IRON,**  
And Cold Blast Charcoal Car Wheel Iron.

**NATIONAL HARDWARE & MALLEABLE IRON WORKS,**  
Lehigh Avenue, American and Third Streets, Philadelphia.  
**THOMAS DEVLIN & CO.,**

MALLEABLE, FINE GRAY IRON AND STEEL CASTINGS made from patterns to order. Special attention given to Tinning, Bronzing, Coppering, Japanning and Fitting. A large line of Carriage and Wagon Castings constantly on hand for the trade.

**S. CHENEY & SON,**  
MANLIUS, N. Y.  
MANUFACTURERS OF LIGHT AND MEDIUM WEIGHT  
**GRAY IRON CASTINGS,**  
METAL PATTERN MAKERS AND JAPANNERS.  
Correspondence solicited.

**BRIDGEWATER IRON CO.,** Bridgewater, Mass.  
Manufacturers of

**SEAMLESS DRAWN BRASS & COPPER TUBES,  
CUT NAILS, HORSE NAILS, FORGINGS, &c.**  
**NAHUM STETSON, Jr., Agent, 73 Pearl Street, New York.**

essentially in condensing a known weight of steam in a known weight of water, say 200 pounds, and calculating the amount of entrained water from the temperatures. Some very elaborate and expensive experiments have been made on this point. In good boilers, with abundant water surface and steam space, the priming does not exceed 3 per cent.; but in badly constructed boilers, with insufficient steam space and water surface, it may rise to 10 or 15 per cent.

Before a test is begun the boiler and setting should be carefully inspected and cleaned, and all leaks and indrafts of air should be stopped. The boilers and settings should be warmed up, and then the fires drawn and the grates cleaned. A fresh fire is then immediately kindled with weighed wood and coal, and the test begun. It has been found that a deposit of 1-16th inch of scale on the heating surfaces caused a loss of 13 per cent. of the fuel; 1/8 inch caused a loss of 33 per cent., and 1/4 inch caused a loss of 60 per cent.

The report of an evaporative test should contain the following data:

1. Date of trial.
2. Description of boiler, giving grate area and heating surface.
3. Kind of fuel.
4. Average steam pressure.
5. Average temperature of feed-water.
6. Total pounds of coal burned.
7. Percentage of ash and moisture in coal.
8. Percentage of combustible in coal.
9. Pounds of coal consumed per square foot of grate.
10. Pounds of water evaporated—total.
11. Pounds of water evaporated per square foot of heating surface.
12. Pounds of water evaporated per pound of coal—actual conditions.
13. Pounds of water evaporated per pound of coal from and at 212°.
14. Pounds of water evaporated per pound of combustible.
15. Pounds of water evaporated per pound of combustible from and at 212°.
16. Rated horse-power of boiler.
17. Horse-power developed.
18. Horse-power above or below rated.
19. Temperature of flue gases, by pyrometer.
20. Force of draft in chimney, in inches of water.

The latter can be obtained by connecting a U-tube with the chimney. Water in the U-tube will rise in the leg connected to the flue, and the difference of level of the water in the two legs of the U gives the data required.

In the discussion which followed, one gentleman reported some tests he had made, when Mr. Kent created considerable merriment by calling his attention to the fact that he had evaporated more than the quantity of water theoretically possible. One member, a prominent steel manufacturer, declared that he was in favor of the plain cylinder boiler as the most reliable, and of the two-flued as next. Another member declared that the two-flued boiler was the only one which could give satisfaction under the very irregular and constantly varying work of a rolling mill. Mr. Kent denied the assertion, declaring that any boiler of proper size, and having sufficient steam room and water surface, could do the work.

### LATEST LEGAL DECISIONS.

ATTACHMENT—NOTICE OF ASSIGNMENT OF CLAIM—STATE LAWS CONFLICTING.

A, a creditor living in Illinois, assigned to B, his creditor, who lived in Louisiana, a debt due him by C, who did business in Minnesota. No notice was given to C of this assignment of the debt. By the laws of Illinois, such an assignment was not valid against attaching creditors unless notice or "intimation" was given to the debtor; but it was valid without notice in Minnesota, where the debtor resided. Without notice, D, of Canada, a creditor of A, sued him in Minnesota, and attached the debt in C's hands. In the suit—*Lewis vs. Lawrence*—the Louisiana creditor, B, was admitted as a party, and the assignment to him was upheld. An appeal was taken to the Supreme Court of Minnesota and the judgment was affirmed. Judge Mitchell, in the opinion, said: "The fiction of law that the domicile of the owner draws to his personal property, wherever situated, must always yield to the law in reference to the attachment of the property of non-resident debtors, because such laws necessarily assume that the property has a situs distinct from the owner's domicile. Attachment or garnishee proceedings are against the property attached—not against the person. They are instituted upon the theory that the thing sought to be reached is situate within the State. It is that alone which gives the court jurisdiction. The question here between the creditors goes to the remedy, and must be decided in favor of the Louisiana creditor."

### PROMISSORY NOTE—PAYMENT—INTENTION.

A note was deposited in bank B for collection, and it was sent to bank C, at the residence of the maker, to be collected. F, the note teller of bank C, protested the note for non-payment, but supposed that he had failed to make the protest in time. He paid the amount of the note to his own bank, which then remitted to bank B, and the note was then indorsed to F, who brought suit on it against a guarantor. In this case—*Fogarty vs. Wilson*—the plaintiff recovered, and, on appeal, the Supreme Court of Minnesota affirmed the judgment. The defendant took the ground that the note had been paid. The Chief Justice (Gillilan), in the opinion, said: "The payment of the money by the plaintiff to his bank was not the payment of the note unless it was made with that intention, and there was no relation between the plaintiff and those liable on the note to give the latter any right to have the payment appropriated to their benefit, contrary to the intention of the party making it."

### FIRE INSURANCE—INSURABLE INTEREST—JUDGMENT CREDITOR.

S, who was a judgment creditor of L. Brothers, insured a warehouse of his debtors, worth \$1300, in his own name, for \$900, to cover his debt. The nature of his interest was known to the company when the policy was issued, but when there was a loss it refused to pay the insurance on the ground that the policy was a wager policy, there being no insurable interest in the creditor. In the action for the insurance—*Spare vs. Home Mutual Insurance Co.*—in the United States Circuit Court, District of Oregon, Judge Deady, in deciding the case, said: "1. The person insured must have an interest in the property insured or he can suffer

no loss by its destruction; but a judgment creditor, when by statute, as in this State, his judgment is a lien on the real property of his debtor, has an insurable interest in the buildings thereon to the extent of his judgment, the land, with the buildings, being a security for his debt. 2. But as he cannot enforce his lien if he can find sufficient personal property to satisfy the judgment, he must show by his complaint for the insurance money that there is not sufficient personal property to satisfy his debt, and that he must resort to the real estate for its payment, or he does not state enough to justify a recovery against the insurance company."

### SALE OF MINING SHARES—SPECIFIC PERFORMANCE.

Shares in a mining company were bought from H by F, and on the refusal to deliver them suit was brought to compel the performance of the contract. There had been no sales of stock, and it had not been put on the lists of any of the stock exchanges. In this case—*Frue vs. Houghton*—the Supreme Court of Colorado, in affirming the decree in favor of the plaintiff, through Judge Beck, said: "The authorities agree that specific performance of a contract may be enforced of contracts for the delivery of personal property, as well as for the conveyance of real estate. And as specific performance will always be decreed of a contract when compensation cannot be had at law by damages, a court of equity will compel the delivery of the shares of a corporation which have been sold, if there is no way to determine the market value of the stock."

### PARTNERSHIP—INTEREST IN ASSETS.

A partnership was dissolved and the accounts between the partners settled. The books showed a balance due one of the firm of \$999.52. After the settlement, the partner to whose credit the balance stood, sued the other members of the firm for it—*Lambert vs. Griffith*—but was defeated. An appeal was taken to the Supreme Court of Michigan, and the decree was there affirmed. Judge Campbell, in the opinion, said: "The complainant has ground for his suit. The interest which a partner has in a firm consists usually, if not always, in his share of the assets after all the accounts are settled between the partners and the debts paid. This credit of \$999.52 appeared distinctly on the books, and must necessarily have formed a part of any such accounting."

### Spontaneous Combustion of Coal.

The following letter, addressed to the British Board of Trade by Messrs. Lindsay & Co., of London, and relating to the subject of spontaneous combustion of coal, will be read with interest by shipowners and others interested in this important question:

The question of spontaneous combustion of coal cargoes on long voyages is of such vital importance to shipowners and underwriters, and has received so much attention from your board, that the following information, which we have to-day received from the captain of our bark *Inchgreen*, concerning his experience on a voyage from Dundee to San Francisco with a coal cargo, is our excuse for troubling you with a long letter. The subscribers would have written you last year on the subject, but, unfortunately, did not personally see Captain Miller, who was otherwise so much engaged during the short time the vessel was in this country that they had no opportunity of learning the particulars of the outward voyage. The *Inchgreen* sailed from Dundee on the evening of the 22d of April, 1881, with 1500 tons of Watson's splint coal on board for cargo. These were shipped on board in fine weather, and, so far as we can remember, were perfectly dry when being loaded. The vessel has got two decks, 'tween-decks being laid, with the exception of a middle space of 3 feet running right fore and aft, for which there are hatches, but with coal cargoes these are not put on. With this particular cargo the coals were about 2 feet from the main deck from the after hatch to the fore hatch, sloping down at both ends, leaving a free space of about 40 feet aft and about the same forward on the 'tween-decks. The ship is very well ventilated, having two bell-mouth ventilators on forecastle, the forward one 7 inches diameter at deck and 14 inches at bell-mouth, the after 9 1/2 inches diameter at deck and 16 1/2 inches at bell-mouth, ventilating both lower holds and 'tween-decks; a ventilator of 11 feet by 9 inches through the house on deck between fore and main hatches for the 'tween-decks only; another 3 feet square, ventilating lower holds and 'tween-decks abaft mainmast; another, 2 1/2 feet square, ventilating 'tween-decks about 12 feet from after collision bulkhead. With ordinary cargoes, such as sugar, &c., the forward and after ventilators alone are used, and so well has the ventilation been arranged that with a cargo of low Manila sugar it was impossible to detect that there was sugar on board from the smell on the vessel's arrival in London; and at present, with a cargo of Java sugar there is not the slightest appearance of sweat or discoloration on any of the baskets, so far as can be seen, thus showing the thorough efficiency of the ventilation. On the 12th of May, after being three weeks out from Dundee, in lat. 36° 14' N., long. 19° W., Captain Miller discovered that the coals were heating, and that there was a dense vapor rising from them, which the ventilation then in use did not seem capable of carrying off. He caused a passage to be dug from the main hatch forward, and with the view of improving the ventilation, cut a circular opening in one of the fore hatches, into which he shifted one of the forward ventilators, erecting a small windmill at its mouth, he believing this would draw off the vapor and heated gases much more rapidly than by the ordinary action of the ventilators. The coals at this time had become so heated that it was almost impossible to stand on them, and Captain Miller was very apprehensive of the safety of his ship. Soon after the application of the windmill an improvement was observed, which daily continued, until at the end of three weeks there was no sign of heat in the holds, the coals continuing cool until the termination of the voyage at San Francisco on the 2d of October, 162 days from Dundee. At that particular time, nearly all the ships sailing from Dundee and arriving at San Francisco were more or less affected



## AUBURN FILE WORKS,

Superior Hand-Cut  
**FILES AND RASPS,**  
MADE FROM IMPORTED STEEL. EVERY FILE WARRANTED.  
**FULLER BROS., Sole Agents,**  
97 Chambers and 81 Reade Streets, N. Y.



**McCAFFREY & BRO.,**

PENNSYLVANIA FILE WORKS

Philadelphia, Pa., U. S.



Manufacture and keep in stock a full line of **FILES** and **RASPS** only, for which we claim special advantages over the ordinary goods, and ask domestic and foreign buyers to allow us to compete for their trade.

Superiority acknowledged wherever used, sold or exhibited.

## DETROIT FILE WORKS,

DETROIT, MICH.

MANUFACTURERS OF **FILES & RASPS** The Largest Hand File  
Send for Catalogue. Works in the U. S.

Proprietors: **ROWE & HAYES, Detroit, Mich.**

**HISCOX** EQUAL TO THE  
**FILE MFG. CO., FILES.** BEST.  
West Chelmsford Mass. Send for Prices.

## GRAHAM & HAINES,

P. O. Box 1049. 113 Chambers and 95 Reade Streets, New York.

HARDWARE MANUFACTURERS' AGENTS AS FOLLOWS:

HOWARD BROS., Cotton, Wool and Curry Cards.  
DERBY & BALL, Sizing Machines.  
CHAS. F. HILL, Steel Forks, Rakes, Hoes, &c.  
H. K. KICKER, Saws, Axes, & Tools.  
HENRY W. ED., Nail Hammer.  
BRO. (City Tool Works Limited), Vices, Picks, Mat-  
locks, Grub Hoes, &c.  
DETROIT BLOCK WORKS, Tackle Blocks.  
FRENCH CASTERS CO., Martin's Patent Casters.  
NIMICK & BRITTON MFG. CO., Locks, &c.  
SANDUSKY TOOL CO., Planes & Plane Irons.  
GEO. M. EDDY & CO., Measuring Tapes.  
MILES' Alarm Money Drawer.  
NORTHWESTERN HORSE NAIL CO., Horse Nails.  
A. G. COBB & CO., Coar's Genuine Screw Wrenches.  
W. H. HOWELL, Laundry Irons.  
BEDGOWICK MFG. CO., Butter and Flour Tryers, &c.  
SCANDIAVIAN PAILCOCK.  
BEST OF ALL EGG-BEATERS.  
RIPLEY MFG. CO., Mouse Traps.

SAM'L. LORING, Plymouth Tack and Rivet Works.  
J. BARTLEY & CO., Sand and Emery Paper.  
PORTER MFG. CO., Window and Door Screen Corners.  
PAYSON MFG. CO., Perfect Sash Lock.  
J. MALLISON, Cast Steel Shears & Scissors.  
KETCHUM'S Patent Metallic Sieves.  
W. D. TURNER & CO., Geneva Hand Filers.  
R. S. CLARK, Hand & Sleigh Bells.  
P. LOWENSTRAUT, Compasses, Calipers, Dividers, &c.  
CLARK BROS. & CO., Carriage Bolts, &c.  
LOWENSTRAUT & TUCKER, The Genuine Knox Fluting Mach.  
A. N. BRADY & CO., N. Y. & Ger. Snaps.  
KENTUCKY BELL CO., "Dodge's" Kentucky Cow Bells.  
G. & H. EUREKA Family Glue Pot and Furnace.  
LAKE BROS., Swift's and Grocers' Coffee Mills and  
Measuring Faucets, &c.  
T. C. RICHARDS HARDWARE CO., Bright Wire Goods.  
Picture Nails, &c.  
Wm. FLAUCH & SON, Bellows.  
J. HAINES & CO., "S" Hard Steel Fence Wire.

[This Advertisement Changed Weekly.]

## CARRIAGE AND WAGON HARDWARE

OF EVERY DESCRIPTION.

Largest Variety Made by any House.



Wagon Box Rod, with Solid Forged Head  
and Wrought Nuts.

Send for new Circular of Wagon Hardware, just issued.

**THE E. D. CLAPP MFG. CO.,**  
AUBURN, N. Y.

## HENLEY'S CHALLENGE ROLLER SKATE.

The Latest and Best and Most  
Complete Scientific  
**SKATE**  
IN THE MARKET.

PATENTED

October 16, 1880,

AND

August 23, 1881.



LIBERAL TERMS TO THE TRADE.

For Prices, Circulars and further particulars, address, mentioning *The Iron Age*,  
**M. C. HENLEY, Patentee and Manufacturer,**  
309 North Fourteenth Street, RICHMOND, IND.

## TACKS, NAILS & RIVETS.

Sizes Iron Upstoppers, Gimp, Lace and Card Tacks. Black and Tinned Trunk and Clout Nails.  
Finishing Nails and Brads; Shoe Nails of Swedes and Common Iron; Copper, Brass & Steel  
Liang & Saddle Nails; Tufting Nails & Tufting Buttons; Brass and Iron Wire  
Nails, Molding Nails, Escutcheon Pins, Black and Galvanized  
Regular and Chisel Pointed Boat Nails.

New York Salesroom, 116 Chambers Street.

**AMERICAN TACK CO.,** Fairhaven, Mass.

## Nicholson FILES.

Bandsaw Files,  
Boot Heel,  
Brass,  
Cabinet,  
Cant,  
Cotter Taper,  
Cotter Equaling,  
Cross or Crossing,  
Doctor,  
Drill,  
Feather Edge,  
Finishing,  
Flat,  
Flat Equaling,  
Flat Wood,  
Gang-Edger,  
Ginsaw,  
Gulleting,  
Half-Round,  
Half Round Wood,  
Hand,  
Hand Equaling,  
Handsaw Blunt,  
Handsaw (Double-End),  
Handsaw Taper, single-cut,  
Handsaw Taper, double-cut,  
Handsaw Taper, slim,  
High Back,  
Hook-Tooth,  
Knife,  
Knife Blunt,  
Lead Float,  
Lightning,  
Machine Mill,  
Mill,  
Mill Blunt,  
Mill Pointing,  
Pillar,  
Pitsaw,  
Reaper,  
Roller,  
Round,  
Round Blunt,  
Slotting,  
Slim Handsaw Taper,  
Square,  
Square Blunt,  
Square Equaling Files,  
Stave Saw,  
Three-Square Files,  
Three-Square Blunt Files,  
Tumbler Files,  
Union Cut,  
Warding Files,  
Warding Blunt File,  
Warding Round Edge File.

## RASPS.

Baker's,  
Beveled Edge,  
Bread,  
Cabinet,  
File, Flat and Half-Round,  
Flat Shoe,  
Flat Wood,  
Half-Round Shoe,  
Half-Round Wood,  
Horse, Plain and Tanged,  
Horse Mouth,  
Jig,  
Oval or French Shoe,  
Racer, Plain and Tanged.

## SPECIALTIES.

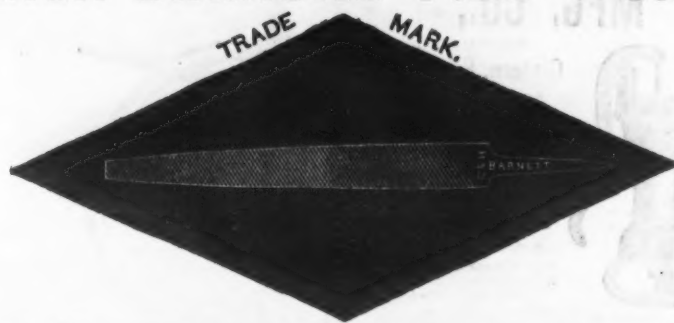
Butchers' Steels, Improved,  
Bent Rifflers, Handled,  
File Cards,  
File Brushes,  
Machinists' Scrapers,  
Stub Files & Holder, Detach-  
able.  
Surface File Holder,  
Vise File Holder.

**NICHOLSON  
FILE CO.,**

PROVIDENCE,  
R. I.,

SOLE MANUFACTURERS.

## BLACK DIAMOND FILE WORKS

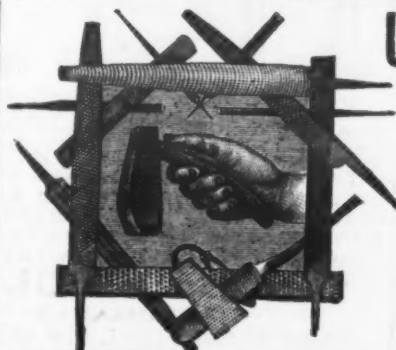


G. & H. Barnett, 21 to 43 Richmond St., Philadelphia.

## CHARLES B. PAUL,

Manufacturer of HAND CUT FILES.

Warranted CAST STEEL. 157 Tenth Street, Williamsburgh, New York.  
All descriptions of Files made to order. Price List mailed on application. Established 1863.



## UNION FILE WORKS

311 to 315 North St.,

BALTIMORE, MD.,

Manufacturers of

## FILES AND RASPS

Made from the Best Refined Cast Steel.

With all the requisite facilities to produce a  
first-class article, we are enabled to offer Files  
that will give entire satisfaction.

**MORITZ & KEIDEL, Agents,**  
48 & 50 German St., Baltimore, Md.

## THRIFT FILE WORKS,

Manufacturers of all kinds of  
**Files, Rasps.**



CHRISTIAN HENSSELER,  
439 & 439 1/2 & 434 Ireland St.,  
PHILADELPHIA, PA.

## FILES

**JOHNSON & BRO.**  
No. 1 Commercial Street, Newark, N. J.

The Patent Combined  
**Dinner Pail and  
Lantern.**

The most perfect Dinner Pail  
in the world. Hot coffee for  
dinner and a Lantern at night.  
Manufactured by J. S. HAIGHT,  
PORT CHESTER, N. Y.  
Sent by express on receipt of  
\$1.00. Agents wanted.

## STOVE REPAIRS.

Repairs for Stoves made at Troy, Albany, Ro-  
chester, Cleveland, Buffalo, Boston, St. Louis,  
Quincy, Chicago, Milwaukee and elsewhere, at  
W. C. METZGER,  
127 W. Randolph St., Chicago, Ill.

## HELLER & BROS., Newark, N. J.,

Manufacturers of the

## Celebrated Hand-Cut American HORSE RASPS AND FILES,



Made of the best American Steel, and warranted to be unequalled in the market. For sale by Iron  
and Hardware dealers throughout the United States and Canada.

## DODGE, HELLER & LYONS,

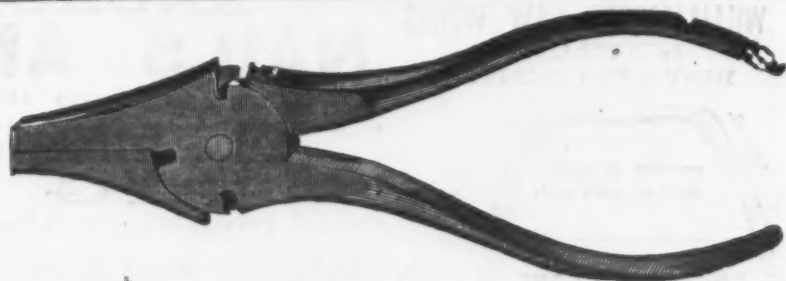
Manufacturers of all kinds of

## FINE CLAY CRUCIBLE CAST STEEL, ALSO OF DODGE'S PATENT

## FORGING AND GRINDING MACHINES,

for forging and grinding most articles of tapering or otherwise irregular form. These machines have  
long been in use in this country and in Europe, and are unexcelled for perfection of work and labor  
saving. We now offer them with the latest improvements.

WORKS AT NEWARK, N. J.



**J. M. KING & CO.**

WATERFORD, N. Y.,

Manufacturers of the **BUTTONS PATENT**

## "WIRE CUTTER AND PLIER COMBINED."

Specially Adapted for Use on Wire Fence.

Also Manufacturers of

Blacksmith and Machinists' Stocks and Dies, Plug and Taper Taps  
Hand, Nut and Screw Taps, Pipe Taps and Reamers.

Price List on application.

Established by DANIEL B. KING, 1850

## LIGGETT SPRING AND AXLE CO.,

LIMITED, MANUFACTURERS OF

## SPRINGS AND AXLES

For Coaches, Phaetons, Buggies, Wagons, &c.

Pittsburgh, Pa.



**TWINE  
BOXES,  
BAG  
FILLERS,  
HAND  
SCOOPS  
&c.**

Send for Illustrated  
Price List.

Manufactured by  
**John Chatillon & Sons,**  
80, 91, 93 Cliff Street, New York.

### THE Greenfield Vertical Engine



is unequalled by any  
other in workmanship  
and quality of material.  
3½ to 30 horse-power.  
Prices lower than any  
other first-class engine.


**COOKE & CO.**  
DEALERS IN  
**MACHINERY  
AND  
SUPPLIES,**  
22 Cortlandt St.,  
NEW YORK.

In writing, please mention this paper.



**Grant Fan Mill & Cradle Co.**  
Manufacturers of  
Grant's Grain, Coffee, Rice, Cochineal  
and Pimento Fans,  
and  
TURKEY WING GRAIN CRADLES  
4, 5 and 6 fingers.  
GRAPE VINE GRAIN CRADLES  
4 fingers.  
SOUTHERN PATTERN GRAIN  
CRADLES,  
4, 5 and 6 fingers.  
All of a superior quality.  
None genuine unless marked  
Grant Fan Mill and Cradle Co.  
Send for illustrated catalogue  
and price list.  
P. O. Address,  
MELROSE, Hampshire Co. N. Y.

**GEORGE W. BRUCE,**  
1 Platt St., New York, Proprietor of the  
**ATLANTIC SCREW WORKS,**  
Agent for the  
**Florence Tack Co. and  
C. A. Maynard.**



**MAYNARD'S C. & Planters'**  
Hilling, Bog and Handled  
Planters, Cotton and Field  
Hoes.  
**BRADY'S Crows, Planters'**  
and Hilling.  
**ELWELL'S Weeding, Plant-**  
ers and grub, and a variety  
of other kinds for Home  
and Export Trade.

**ESTERBROOK'S STEEL  
PENS**

Leading Numbers: 14, 048, 130, 333, 161.

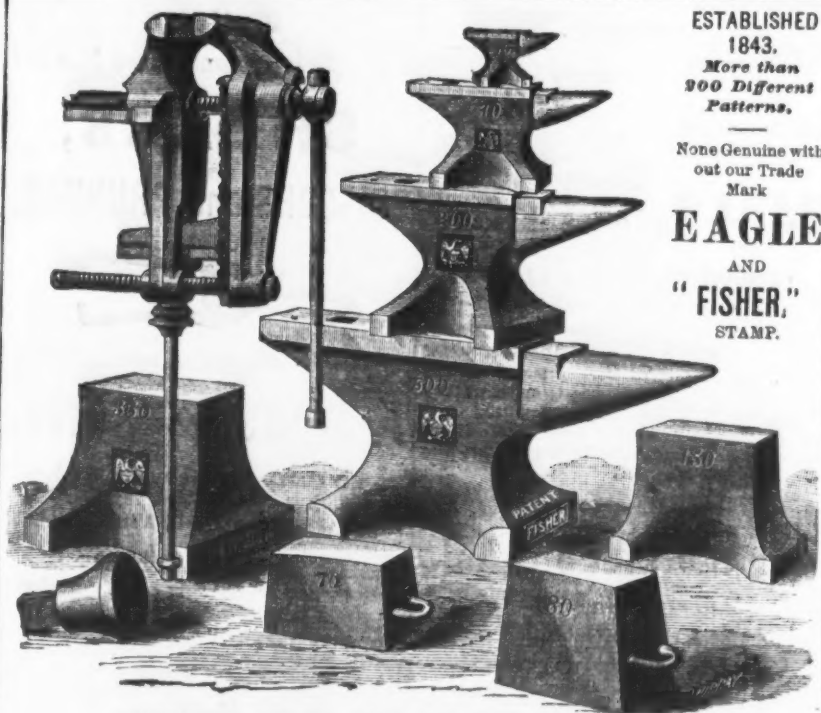
For Sale by all Stationers.

**THE ESTERBROOK STEEL PEN CO.,**  
Works, Camden, N. J. 26 John St., New York.

**DOG COLLARS  
AND  
MUZZLES.**

The only firm in the World who make the man-  
ufacture of Dog Collars and Furnishings a spec-  
ialty.  
Collars Made of Leather and Metal of  
all kinds,  
and the only firm who manufacture the  
**CELLULOID DOG COLLAR.**  
Send for Illustrated Catalogue 1883.

**MEDFORD FANCY GOODS CO.,**  
101 Chambers St., cor. Church, New York.



**ESTABLISHED  
1843.  
More than  
900 Different  
Patterns.**

None Genuine with  
out our Trade  
Mark

**EAGLE  
AND  
"FISHER"  
STAMP.**

**WARRANTED BETTER THAN THE BEST ENGLISH ANVIL!**  
Face in one piece of BEST TOOL CAST STEEL, PERFECTLY WELDED, perfectly true, of  
hardest temper and never to come off or "settle." Horn of tough untempered steel, never to break or  
bend. Only Anvil made in United States fully warranted as above.

**FISHER DOUBLE-SCREW VISE**  
IS FULLY WARRANTED STRONGER THAN ANY OTHER LEG VISE, AND ALWAYS PARALLEL.  
Is the best Vise for Machine Shops and Blacksmiths, and for all heavy work. ACCURATE AND  
DURABLE. Send for Circular.

**EAGLE ANVIL WORKS, Trenton, N. J.**

**RICHARD DUDGEON,**  
No. 24 Columbia Street, New York.

Maker and Patentee of the improved  
**Hydraulic Jacks**  
AND  
**Punches.**

Roller Tube Expanders and Direct Acting Steam Hammers  
Communications by letter will receive prompt attention.  
Jacks for pressing on Car Wheels or Crank Pins made to order.

**THE ANSONIA CORRUGATED STOVE PLATFORM**  
With Patented O. G. Border.

**ROUND, SQUARE AND OB-  
LONG, IN ALL SIZES.**

Manufactured of heavy metal, requiring  
no nailing or lining, the edge retaining its  
form. Superior pattern, finish and quality.  
Price as low as any.

Send for List and Discount.  
Packed 12 in each case.

**ANSONIA BRASS AND COPPER CO.,**  
MANUFACTURERS OF  
**PURE ELECTRIC WIRE.**  
For Magnets, Telegraphs, Telephones, &c.  
Insulated on the bare wire with H. Splittorf's patented Liquid Insulation, covered with cotton or silk.  
All sizes of Bare and Covered Wire in Stock.  
The conductivity of every bundle tested and warranted.

**THE ANSONIA WROUGHT GONGS,**  
For Clocks, Indicators, Telephones, Car Bells, Bell Punches, Steamboat and  
Railroad Use. Burnished or Nickel Plated.

**ANSONIA BRASS AND COPPER CO., 19 Cliff St., New York.**

**THE ESSEX HORSE NAIL CO., Limited.**

**THE ESSEX HORSE NAILS**  
Are drawn from the Best Norway Iron Rods only. They are hot forged and cold-  
pointed, rendering them both tough and stiff, and are warranted  
**FIRST-CLASS IN EVERY RESPECT.**  
By the use of improved machines we forge Fifty per cent. More Nails on a machine  
than any other company, and are thus enabled to sell them proportionately less than any  
other nail of equal quality. All nails branded ESSEX fully guaranteed.

**GENERAL AGENTS:**  
**HOWE & CO., Troy, N. Y.**

**Stanley Rule & Level Co.,**  
MANUFACTURERS OF  
**Improved  
Carpenters'  
Tools.**

Manufacturers of Bailey's Patent Adjustable Planes.  
General Agents for the sale of Leonard Bailey & Co.'s "Victor Planes."  
Manufacturers of "Defiance" Patent Adjustable Planes.

**FOUNDRIYMEN, ATTENTION!**  
FOR THE

**Aiken & Drummond Patent Power Molding Machines**  
SEND FOR DESCRIPTIVE CIRCULAR TO  
**THE DRUMMOND MFG. CO., Louisville, Ky.**

**NOVELTY IRON FOUNDRY,  
HAIGHT & CLARK,**  
16 & 18 DeWitt Street, ALBANY, N. Y.,  
MANUFACTURERS OF FINE GRAY IRON CASTINGS  
OF EVERY DESCRIPTION.  
Rosettes and Pickets for Wire Workers, Castings for Furniture and Piano Manufacturers. Iron and  
Metal Patterns of all kinds a specialty. Correspondence solicited.

**JAPANNING. BRONZING.**

by fire in their cargoes. We think it proba-  
ble that the Inchgreen's immunity from fire  
is owing to the simple contrivance arranged  
by Captain Miller, and we bring the matter  
before you with the desire of its being made  
known to shipowners and shipmasters load-  
ing similar cargoes.

### English Iron and the American Market.

The *Ironmonger* publishes the following  
communication from "A well-informed firm  
at Liverpool:"  
It need scarcely be said that English man-  
ufacturers take a deep interest in the Ameri-  
can iron trade. Prior to the enormous  
development of the home production the  
United States were steady and growing cus-  
tomers for all descriptions of iron and tin  
plates, but during the last 10 years the de-  
mand has been uncertain and spasmodic.  
This will be manifest from the following  
figures, showing the imports of iron and  
steel into the United States during the respec-  
tive years:

	Tons.	Tons.	Tons.
1873.....	717,661	1880.....	2,112,341
1876.....	228,716	1881.....	1,321,767
1878.....	236,434	1882.....	1,343,852

Such sudden expansion and contraction  
could not fail to have very decided effects  
on the English iron trade, and experience  
has proved beyond all possibility of contra-  
diction that the effects are, on the whole,  
decidedly injurious to the best interests of  
that trade. This has been more manifest in  
the history of the last two or three years  
than at any former period. In 1872-73,  
for example, the upward movement in prices  
was greater and extended over a much  
longer period than in 1879-80. In the  
former, prices steadily advanced from the  
end of 1871 to the middle of 1873, while the  
later movement, beginning at the end of  
1879, had expended its utmost force by the  
beginning of 1880, and since that time, not-  
withstanding an exceptionally large trade,  
the fluctuations have been of quite a moder-  
ate character, as the following table of  
highest and lowest prices of Scotch warrants  
will show:

	Lowest price.	Highest price.
1871.....	51/	72/6
1872.....	73/	137/6
1873.....	103/	145/7
1874.....	40/	68/6
1875.....	44/6	73/3
1876.....	45/	53/6
1877.....	46/8	53/1

During the same period the extension of  
the home production in America has been  
quite remarkable, say from 2,854,558 tons in  
1872 to 5,178,122 tons in 1882, and this has  
enabled the United States (except during  
periods of exceptional demand) to supply her  
own requirements without much help from  
other countries. The recollections of the  
"boom" (as it was called) in 1879-80 are  
rather unpleasant, and the experience of  
many merchants has taught them a lesson,  
which is likely to affect future transactions  
with the United States. During the sudden  
rise in prices considerable contracts were  
entered into by American buyers, and as  
many of these were made at high prices,  
difficulties such as had not been anticipated  
were experienced, and the ultimate results  
were certainly disastrous to one, if not both,  
parties. Whether the conclusion be right or  
not, the impression left on English dealers is  
that the Americans did not come out of that  
business so well as had been anticipated, nor  
did they maintain that high character for  
which they previously had credit. One rea-  
son, no doubt, was that their long absence  
from the English market, and dealing for so  
long a period in almost exclusively American  
irons, rendered American buyers unfamiliar  
with the quality of English makers, and dif-  
ficulties arose in consequence. In future,  
however, these points must be borne in  
mind.

The late changes in the tariff led some to  
anticipate a considerable increase in our  
trade with America. Others argued that, as  
the changes were made by the party favor-  
able to protection, it might be fairly assumed  
that the changes would be such as could be  
borne by the home producers, and not suffi-  
cient to admit of any large foreign import-  
ations. This latter view appears likely to be  
the more correct one. It is anticipated,  
however, that the principle of free trade  
with foreign countries once being admitted,  
we may look for further changes favorable  
to foreign competitors. These changes,  
however, must be slow and gradual, so as  
not to harass the manufacturers and laborers  
who are largely interested in the home pro-  
duction. The uncertainty, however, which  
is now likely to prevail respecting the future  
tariff on imports must seriously affect the  
further development of home industries, and  
this of itself must be beneficial alike to the  
manufacturers of the United States and  
England, as it has been the great expansion  
of the last few years which has led to the  
present depression. With respect to the  
new tariff which comes into operation on  
July 1, it is anticipated that in consequence  
of the hurried manner in which the bill was  
drawn up there will be found to be several  
anomalies, the effect of which may be in-  
jurious or beneficial to the American man-  
ufacturer, just according to the way in which  
they are interpreted by the Treasury au-  
thorities.

**Wind Pressures.**—A writer in *Long-  
man's Magazine* says: "Three years ago we  
were startled and horrified by the news that  
the Tay Bridge had fallen when a train was  
passing over it, and the investigation which  
followed brought into prominent notice not  
only the very great diversity of opinion as to  
wind pressure, but the necessity that some  
definite result should be arrived at. It ap-  
peared from the examination of engineers of  
the highest repute that they had no exact  
knowledge as to whether the extreme prob-  
able force of wind should be taken as 10  
pounds on a square foot, or 20 or 40. It was  
admitted that pressures of 40 pounds had  
been registered, but they were considered so  
exceptional and restricted that it had been  
deemed unnecessary to make a full provision  
for them. But on October 14, 1881, a pres-  
sure of 53 pounds was registered at Green-  
wich almost at the very moment when 35  
magnificent trees in the immediate neighbor-  
hood were prostrated; that particular gust  
of intense pressure was by no means re-

stricted to an area of a few yards. Nor is  
this pressure of 53 pounds the highest that has  
been recorded. During a gale at Liverpool  
in March, 1871, the pencil anemometer was  
driven far beyond the scale, and was esti-  
mated to have marked a pressure of 90  
pounds. It is impossible to say whether these  
are actual pressures or not. Professor Stokes,  
who speaks with high authority, considers  
that the register of a pressure plate is 80  
per cent. too high, a correction which would  
reduce these pressures to 30 and to 50 pounds  
to the square foot; but many observers and  
men of great practical experience (among  
others Mr. Osler and Mr. Symons) believe  
that the registered pressure is, by a balance  
of errors, not very far from the truth."

### New Hand Shear for Cutting Flat and Round Iron.

The occasional need in every shop of a  
tool for cutting plates and round bars of iron  
and other metals gives importance to a new  
tool designed for such work, shown in the  
accompanying engravings, and manufac-  
tured by the Eureka Shear Co., No. 810



New Hand Shear.—Fig. 1.—Gauge Set for  
Shearing, with Wire-Cutting Die.

Market street, Philadelphia. The com-  
bination of a wire cutter with the blade  
of a shear is not entirely new, but we have  
never before seen the latter placed back of  
the pivot nor in the form of a die, as in this  
case.

The inventor claims for this tool that  
the No. 1 shear will cut rounds up to ¼  
inch in diameter, and flats up to ½ inch.  
The body of the shear is made of cast  
steel, and the dies and cutters of superi-  
or tool steel. As will be seen from the

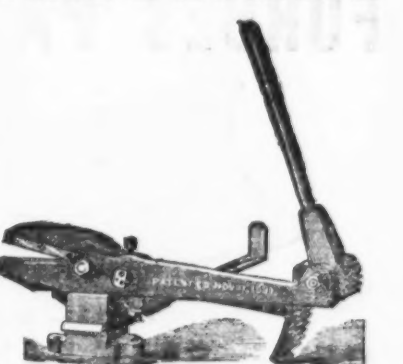


Fig. 2.—Gauge Set for Wire Cutting.

accompanying engravings, the shear may  
either be bolted to the bench or clamped in a  
vise, for which purpose shoulders on the base  
are provided, thus insuring the great con-  
venience of placing it at any time wherever  
most needed in the shop. The power ob-  
tained by the arrangement of lever with  
pinion and rack is obvious. For the  
cutting of round iron a die is inserted in  
the fixed arm of the shear, while the mov-  
able arm carries the cutter. In the die, holes  
of three different sizes are drilled. An ad-  
justable gauge is attached to the shears, so  
as to insure cutting to the required length.  
This adjustable gauge is movable and may  
be attached underneath the die for cutting  
rounds, or underneath the flat shears, or  
may be removed altogether if wide sheet  
metal is to be cut.

### Driven-Well Patents.

The Federal Court at Des Moines, Iowa, on  
the 10th inst. rendered an opinion on the  
question of the validity of Nelson W. Green's  
driven-well patent, a case that has been pend-  
ing for some time. The court holds that  
there are two well-established instances of  
prior use of the principle involved in this  
patent, one of them being at Independence,  
Iowa, where a well was sunk in the early  
summer of 1861, and the other at Milwaukee,  
where a large number of them were put  
down as early as 1849, the patent to Green  
not having been issued till 1868, and the ap-  
plication of the principle not having been  
discovered and put into use by him until  
after the well at Independence was proved a  
success. The court holds that Colonel Green  
made no effort to prevent the use of his dis-  
covery by the public for about seven years,  
and it is upon this showing, more than the  
fact that the Iowa and Wisconsin wells anted-  
ated Colonel Green's discovery and applica-  
tion of the principle, that the patent is held  
void. The court also held that the issue was  
void for the reason that it set out a broader  
claim than was contained in the original pat-  
ent. Over 300 actions, principally against  
farmers, for damages, were pending in this  
court on this patent. Many more had con-  
fessed judgment and settled at heavy costs,  
and still others had paid the royalty exacted  
by the drive-well agents, who, a few years  
ago, swarmed over the Iowa prairies hunting  
up causes for action. So annoying had these  
persecutions become that a defensive alliance  
of farmers was formed, and many defended  
their premises with shot-guns against the in-  
cursions of drive-well agents, and in several  
instances mob law was threatened. The re-  
sult was an appeal to the courts, with the  
result as announced. If sustained by the  
Supreme Court the farmers of the Northwest  
will have gained a signal victory over a  
hitherto most exacting monopoly.  
A daily paper commenting on this subject



## Cutlery.

## JOHN WILSON'S CELEBRATED

NO ARTICLE MARKED "WILSON" IS GENUINE, UNLESS IT ALSO BEARS THE

TRADE MARK



"FOUR PEPPERCORNS AND A DIAMOND"

GRANTED A.D. 1766 BY THE CORPORATION OF CUTLERS OF SHEFFIELD, AND PROTECTED BY ACT OF PARLIAMENT.

REGISTERED ALSO AT WASHINGTON, U.S. ACCORDING TO ACT OF CONGRESS.

ALSO AT LEIPZIG, IN ACCORDANCE WITH THE GERMAN TRADE MARKS' REGISTRATION ACT.

WILSONS—SYCAMORE ST., SHEFFIELD, ENGLAND. Established 1750.

## AMERICAN MADE RAZORS



J. R. TORREY,

MANUFACTURER OF

## STROPS

In All Styles.

J. R. TORREY RAZOR CO.,

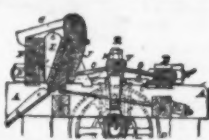
MANUFACTURERS OF

## RAZORS.

To introduce we offer HOLLOW GROUND RAZORS at \$1.50, \$2.75, \$3.25, \$4.00, \$5.00. Our SWEDISH RAZORS, \$1.75, \$2.25, \$3.00, \$4.00. All our own make, and warranted the best cutters in the world. As razor makers we know what is needed to sharpen a dull razor, and will mail for 75 cents a strop warranted to set a fine edge to any razor. If in morocco case, \$1.00. Catalogues to the trade.

Western Office, 36 Sixth Street, Pittsburgh, Pa.

**BLAKE CRUSHER CO.,**  
New Haven Conn.



**BLAKE'S**  
Challenge Rock Breakers.  
Patented Nov. 18, 1879.

See The Iron Age first issue of the month.

**MARTIN REYNOLDS,**

354 Lorimer St., Brooklyn, E. D.,

**Brass Smelter & Refiner.**

Ingot Brass for Car Bearings a specialty.  
Brass washings for bell makers always on hand.

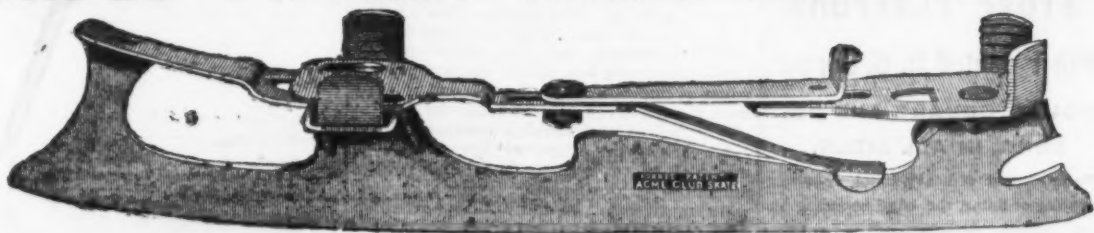
**ONEIDA ALARM TILL.**

SUSCEPTIBLE OF OVER 100 CHANGES.

Better than any other Till in the market. No tampering with keys, as it alarms every time a key is touched, unless acquainted with combination. Send for price and compare this Till with others in the market. No Till-tapping possible.

MANUFACTURED BY  
**THE ONEIDA ALARM TILL CO.,**  
EAST SYRACUSE, N. Y.

## FORBES' PATENT ACME CLUB SKATE.



Universally Acknowledged the  
**BEST SELF-FASTENING SKATE EVER INVENTED.**

Retains the First Place and Foremost Rank for Demonstrated Superiority.

**DAME, STODDARD & KENDALL,**

SUCCESSORS TO

**BRADFORD & ANTHONY,**

AGENTS FOR THE UNITED STATES,

374 WASHINGTON STREET,

BOSTON, MASS.

For Sale by all the Principal Dealers.

**GEO. H. CREED,**  
**SHIP CHANDLERY,**

108 Reade Street, New York.

Manufacturers of and Wholesale Dealers in  
Cotton and "Long Flax" Sail Duck,  
Cotton and Linen Havens,  
Creed's Patent Ship's Clews, Holtman's Wire Rop.  
Belgers. Agent for Raymond's American Crane Co.  
for Lubricating Cylinders and Valves.

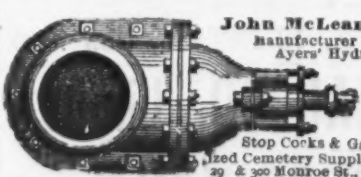


## SCROLL SAWS.

The "Challenge" and "Rival"  
are the finest foot-power Scroll Saws  
in the world, with or without Lathe  
attachment.

Price, \$10 to \$20.

New Catalogue free. Address  
**SENECA MFG. CO.,**  
Seneca Falls N. Y., U. S.



**John McLean,**  
Manufacturer of  
Ayers' Hydrants,  
Stop Cocks & Galvan.  
Used Cemetery Supplies,  
29 & 30 Monroe St., N. Y.

Office of

## PHOENIX CASTER CO.,

Indianapolis, Ind.

## MARTIN'S CASTER

For heavy bedsteads, book-cases, flower  
stands, refrigerators, safes, sideboards,  
desks, or very heavy furniture. Also for  
heavy ice chests, magazine boxes, stove  
trucks, heavy showcases, beer boxes, or any  
very heavy weight. Especially adapted for  
use in beer bottling, fruit canning, tobacco  
or warehouse establishments, where heavily  
loaded tables need to be moved.

Send for Catalogue.



Our Driver is so uniform, simply  
inserted in the hole, and  
drives all competition from the field.



**WROUGHT IRON  
ADJUSTABLE**

"Forty Day's Trucks in use. Just  
what we wanted."  
**WASHINGTON STAMPING COMPANY,**  
Washington, Ohio.

**TUCKER & DORSEY,**  
MANUFACTURERS,  
INDIANAPOLIS, IND.

## Cutlery.

**CORPORATE MARK,**



**Joseph Rodgers & Sons'**

(LIMITED)

**CELEBRATED CUTLERY,**

No. 82 Chambers Street, New York.

**F. & W. CLATWORTHY, Agents,**

The demand for **Joseph Rodgers & Sons'**  
productions having considerably increased, they  
have, in order to meet it, greatly extended their  
Manufacturing Premises and Steam-power  
To distinguish Articles of **Joseph Rodgers  
& Sons'** Manufacture, please to see that they bear  
their Corporate Mark.

ESTABLISHED 1836.

**ALFRED FIELD & CO.,**

93 Chambers and 75 Reade Streets,

NEW YORK,

**SOLE AGENTS FOR**

Ely Bros., Caps, Wads, &c.,

Joseph Elliot & Sons, Razors,

Isaac Greaves, Sheep Shears, &c.,

Robert Sorby & Sons, Sheep Shears, &c.,

Edward Elwell, Hoes, &c.,

R. & J. Linacre, Grass Hooks and Sickles,

Webster & Horsfall Steel Wire,

GENERAL AGENTS,

Western File Co.'s American Files.

HEADQUARTERS FOR

**ANVILS CHAIN CUTLERY, GUNS,**

&c. &c. &c.

**A. F. BANNISTER & CO.**

SUCCESSORS TO

**FURNESS, BANNISTER & CO.,**

MANUFACTURERS OF

**TABLE CUTLERY,**

Cor. Nassau & Sheffield Sts., NEWARK, N. J.

## Cutlery.

Best Quality Japanned and Nickoled

**SHEARS,  
SCISSORS and PRUNERS.**



Manufactured by

**J. WISS & SONS,**

26 Bank St., Newark, N. J.

FOR SALE BY ALL RELIABLE DEALERS.

Send for New Catalogue.

**THREE PRIZE MEDALS.**



PARIS, 1855.

PARIS, 1878.

**MATTHIAS SPENCER & SONS,**

Albion Steel Works, Sheffield,

MANUFACTURERS OF

**FILES**

AND

**STEEL,**

Table Knives, Razors, Shovels, &c., &c.,  
of every description.

**CORPORATE MARK.**

**SPENCER  
SHEFFIELD**  
Granted 1749.

PATENTED ARTICLES

**MALLEABLE IRON.**

Hammer's Malleable Iron Hand Lamps.



Screw, Kerosene Size.

Hammer's Adjustable Clamps.

Hammer's Malleable Iron Oilers, 3 Sizes.

Hammer's M. I. Hanging Lamps.

**NEW** pattern Heavy Screw Clamps;  
strongest in the market.

For sale by all the principal Hardware Dealers.

Send for Price List.

**MALLEABLE IRON CASTINGS**

Of superior quality, and Hardware Specialties  
in Malleable Iron made to order.

**HAMMER & CO.,**

Branford, Conn.

**MALLESON'S**

Patent Central Action

(DOUBLE)

**Multiplying Reel,**

With Flush Handle and Adjust-  
able Click.

For Sale by the Jobbing  
Trade Generally.

Send for Catalogue and  
Price List of SPLIT BAMBOO,  
JOINTED BAMBOO and WOOD  
RODS; REELS, ROD MOUNT-  
INGS, &c., &c.

**FREDERICK MALLESON,**

Manufacturer,

136, 138, 140, 142, 144 First St.,

Brooklyn, E. D., N. Y.

PATENT

Anti-Friction

**CASTERS.**

MADE IN SIXTY STYLES,

from Fine Brass Furniture Casters to Heavy Truck Casters  
weighing 70 lbs. per set. These goods have proved their  
practical merits for Furniture, 8000 sets being used last  
year by makers of Folding Beds alone.  
Send for new catalogue.

**PAYSON MFG. CO., Chicago.**

H. J. BRAINERD, Agent, 110 Pearl Street, New York.

NASHUA LOCK CO., Agents, Boston, Mass.



No. 152, Oblong Plate,

Established in 1839.

**A. G. COES & CO.,**

WORCESTER,

MASS.

Successors to

**L. & A. G. Coes,**

Manufacturers of

THE GENUINE

**COES**

**Screw  
Wrenches.**

PATENTED,

May 9, 1871.

December 26, 1871.

December 28, 1875

August 1, 1876

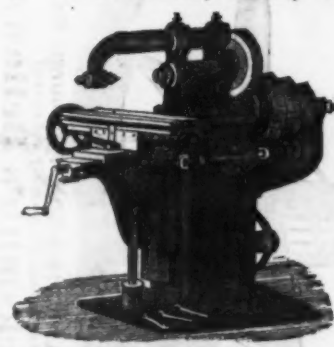
The backstraps when the wrench is borne  
by the bar—not by the handle.  
The strongest Wrench made, and the only suc-  
cessful Re-enforced Bar.  
None genuine unless stamped

**A. G. COES & CO.**

Our Agents, GRAHAM & HAINES, 113 Chamber  
St., New York, carry a full line of our goods, and  
will be pleased to serve you at factory prices.

**W. R. EYNON & SONS,**

CLEVELAND, OHIO.



MANUFACTURERS OF  
MACHINIST TOOLS, MILLING MACHINES,  
Die Sinks, Universal Heads, Index Centers, Univ.  
sal Vices, Grinding Attachment for Lathes, Centering  
Machines. Gear Cutting and Milling Done.

Office and Works, No. 73 Scranton Ave



**TREE AND  
HEDGE  
TRIMMER.**

Unsurpassed for  
cheapness and dur-  
ability. Unlike any  
other make, it com-  
bines a perfect lever  
principle with a  
blade working in a  
slotted steel hook.  
Send for illustrated  
circular and price  
list.

**E. S. LEE & CO.,**  
164 West Main  
Street,

ROCHESTER, N. Y.

**THE WIRE GOODS CO.,**

Worcester, Mass.,

MANUFACTURERS OF

**SHARP GIMLET POINTED**

**WIRE GOODS.**

WIRE BENDING A SPECIALTY.

Wire Straightened and Cut to  
Length.

**RIFLE MANUFACTURERS.**

Dealers' Firm Names put on when desired.

**GUNS**

AND

**PISTOLS.**

WHOLESALE ONLY.

American and English Goods, Fishing Tackle,

Winchester and Other American Rifles.

Manufacturers of Leather Gun Cases, Hol-  
sters, Bags and Clothing of  
Leather and Duck.

Dealers who visit us will always find Job Lots.

166 Main St., CINCINNATI

**B. KITTREDGE & CO.**

**BARNES' SAWS.**

Complete Outfits for Workshop Business.

Lathes for Wood or Metal, at

**CHARLES E. LITTLE'S,**

(Eastern Agency. Factory Prices.)  
59 FULTON ST., NEW YORK,

Descriptive Catalogue Free



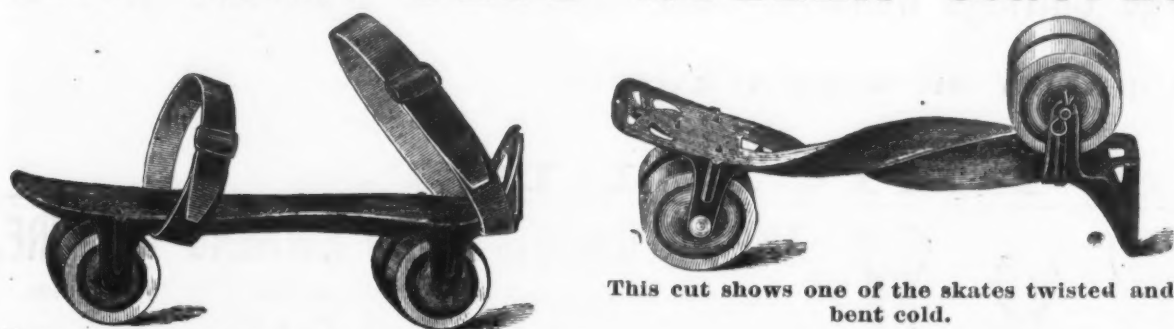
# HALL & ELTON'S GERMAN SILVER.



In addition to Spoons of this well-known brand, we are now prepared to furnish Forks of the same quality. We GUARANTEE these goods to be SOLID and of UNIFORM quality throughout, with no coatings to wear through or flake off, and with no liability to RUST.

HALL, ELTON & CO., Wallingford, Conn., and 47 East 13th St., New York.

## NEW YORK CLUB ROLLER SKATES.



This cut shows one of the skates twisted and bent cold.

The lightest, easiest working and most durable Roller Skate ever made. The frames are made from a fine quality of decarbonized steel, and cannot possibly be broken in using. The heel support is preferable to the ordinary one of leather, as it cannot wear through. Besides these, the skate has many other advantages, and the price is low as compared with others. Patented June 21, 1881.

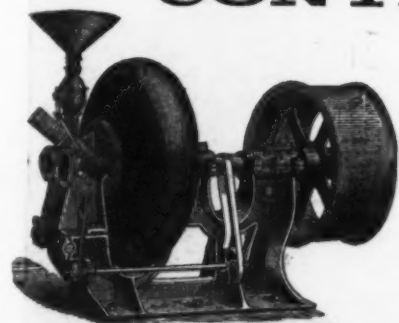
MANUFACTURED BY

W. A. SUTTON,

522, 524, 526, 528 and 530 West 20th Street, NEW YORK.

## CONTINENTAL WORKS

BROOKLYN, N. Y.



DUC'S Mechanical ATOMIZER Or Pulverizer.

For reducing to an impalpable powder all kinds of hard and brittle substances, such as QUARTZ, EMERY, CORUNDUM, GOLD AND SILVER ORES, BARYTES, COAL, OCHRE, MANGANESE IRON ORES.

PHOSPHATE ROCK, &c.

It is simple and not liable to get out of order. Revolving Shell being constructed of Siemens-Martin steel, and all parts mechanical in design and of first-class construction. Weight, 5,500 lbs. heaviest piece, 1,500 lbs. It will pulverize 7 to 10 TONS IN 10 HOURS with 30 H. P.

For Circulars and full particulars, apply to or address

THOS. F. ROWLAND, Sole Manuf'r, Brooklyn, N. Y.

## SHEET-IRON BUILDING MATERIALS.

ROOFING.  
SIDING.  
CEILING.

Patent Cap Seam Roofing, in Four Styles. In Sheets or Rolls.

Crimped Iron, for Siding or Roofing for Elevators, Mills and Factories.

Paneled and Crimped Iron Ceiling. Durable, Attractive, Fire-proof.

Send for Prices and Circulars to

A. NORTROP & CO., 97 First Ave., PITTSBURGH.

## HOWARD IRON WORKS.

BUFFALO, N. Y.

Manufacturers of

## BENCH VISES.

Price Lists sent on application

## WESTON'S DIFFERENTIAL PULLEY BLOCKS.

CAPACITIES FROM 1-8 TON TO 10 TONS.

ONE MAN CAN LIFT 5000 POUNDS.

THEY HOLD THE LOAD SUSPENDED AT ANY POINT.

ALL SIZES IN STOCK.

SOLE MAKERS:

YALE & TOWNE MFG. CO.,

MANUFACTURERS, ENGINEERS AND MACHINISTS.

Principal Office and Works, STAMFORD, CONN.

SALESROOMS:

NEW YORK—62 Reade Street.

PHILA.—507 Market Street.

BOSTON—224 Franklin Street.

CHICAGO—64 Lake Street.

40 Page Illustrated Catalogue of Light Hoisting Machinery sent on Application.

has the following: "The contest between the farmers and the owners of the driven-well patent, to which public attention was recently directed by Judge Shiras's decision against the patentee, in Iowa, is one of the great legal battles of the West. In the State of Indiana alone there are 50,000 of these wells, for each one of which a royalty of \$10 is demanded, and it is said that ex-Senator McDonald, whose ambition points toward the White House, has endangered his political popularity among the Democratic farmers by acting as attorney for the patentee. The interests involved are so great that the legal status of the controversy is especially interesting. At the recent hearing in Iowa, Judge Nelson, of the United States Circuit Court of Minnesota, and Judge Love, of the United States Circuit Court for the Northern District of Iowa, sat with Judge Shiras. Judge Love concurred in Judge Shiras's decision and Judge Nelson dissented. The appeal will not bring these cases before the Supreme Court of the United States for the first time. When the hearing in Iowa began, an appeal taken by the farmers from a decision made by Judge Gresham, of Indiana (now Postmaster-General), was pending in Washington, the case being that of Wahl against Hine. Only eight of the Supreme Court justices sat at the hearing of that appeal. The Court was equally divided, four justices being on one side and four on the other, so that the Supreme Court must try again. An appeal from the New Jersey district will probably be reached before the appeal which will go up from Iowa. In the meantime the patentee's application for an injunction prohibiting the Indiana farmers from using their wells has been denied. The conclusions of fact found by Judge Shiras are these: That Colonel Green, in 1861, being then in command of the Seventy-sixth Regiment of New York Infantry, put his method of driving wells into public use for the benefit of his regiment, thereby abandoning his invention to the public; and that his invention was in open and public use, with his knowledge and acquiescence, for more than four years before he applied for a patent thereon. In these four years the public acquired rights through the open and uninterrupted use of the discovery. Judge Shiras holds that it necessarily follows from these conclusions of fact that both the original and the reissued letters patent are invalid and void."

### SCIENTIFIC AND TECHNICAL.

#### Relative Dangers of Explosives.

There seems to be considerable doubt, says the London Observer, as to the danger of dynamite, nitro-glycerine, gun-cotton and other explosives when properly packed. It is strange that this should be the case. An explosive is a body of unstable chemical composition, which, when its chemical equilibrium is disturbed, violently expands in bulk. This expansion is called explosion, and the conditions of explosion vary. Gun-cotton may be held in the fingers and burnt; but if a detonator be attached to it, and it be clapped between the palms of the hands, it will blow a man to pieces. Gunpowder may be thrown about with impunity unless there be friction sufficient to produce an actual spark. Chloride of nitrogen—an oily liquid something like chloroform—will explode with terrific violence if the bottle containing it be tapped with a feather. Explosives may be roughly divided into combinations which are purely chemical and those which are chemical and quasi-mechanical. Nitro-glycerine is purely chemical. All purely chemical compounds decompose spontaneously and group themselves into sub-combinations of a treacherous nature. Ordinary nitro-glycerine can be carried about safely. But if kept for any length of time it passes through internal changes which render it unsafe. Amorphous or red phosphorus may be held in the flame of a candle. If left alone for some weeks, it reverts to its original condition of waxy phosphorus, and will burst into a violent flame upon mere contact with atmospheric air.

#### A New Fire-Damp Indicator.

A series of experiments with a new fire-damp indicator was recently concluded in England. The appliance, which was invented by Mr. F. Libin, of Gand, consists of a circular porous vessel, the opening of which is closed by an elastic membrane, a flexible spring reposing upon the membrane, and a regulating screw fixed in a little copper plate over the end of the flexible spring. Owing to the fact that fire-damp is lighter than air, the porous vessel absorbs the carburetted hydrogen, of which fire-damp is essentially composed. The volume of air enclosed in the vessel augments, swells the membrane, and so produces contact between the flexible spring and the regulating screw. An electric circuit is thus established and a bell rings, or a red signal appears, indicating the number of the gallery where the fire-damp is accumulating.

#### Effect of Prolonged Stress on Annealed and Unannealed Iron.

Prof. R. H. Thurston, of Hoboken, recently had occasion to study the effect of prolonged stress upon the various materials in common use in the arts, and, among others, upon the finer qualities of iron. He states that, so far as he is aware, the well known experiment of Vicat, made a half-century ago, had never been repeated. The extreme importance of the results obtained by him had apparently not been realized by either physicists or engineers, and it seemed advisable that the experiment be repeated, and, should the results obtained by Vicat be again reached, that the attention of both scientific and practical men should be again called to the subject. The repetition of Vicat's experiment has not only confirmed his conclusion, but has led to the discovery of a new and important, as well as peculiarly interesting, difference in the effect of prolonged stress upon annealed and unannealed iron. In the autumn of the year 1881, Professor Thurston procured two lots of the best Swedish iron wire from the Trenton Iron and Steel Works, the wire having been specially drawn for the purpose. This wire was divided into two parts, one being carefully annealed, the other being left hard-drawn as it came from the blocks. These were tested in the usual way, and it was

found that the hard wire had about double the strength of the soft. Nine pieces were taken from each reel for test, under prolonged static stress, and were suspended from hooks attached to springs, in order that the effect of jar should not enter into the experiment. They were then loaded with, respectively, in each set, 65, 90, 85, 80, 75, 70, 65, 60, 55 per cent. of the average ultimate strength, as already determined. This was done in November, 1881. Since that date a number have broken as follows:

Per cent. max. static load.	Time under stress.	
	Hard wire (unannealed).	Soft (annealed).
95	80 days.	3 minutes.
90	35 days.	5 minutes.
85	17 mos. unbroken.	1 day.
80	91 days.	206 days.
75	Unbroken.	17 "
70	"	455 "
65	"	455 "
60	"	Unbroken.
55	"	"

Thus, wire loaded with but 65 per cent. of the breaking load, as usually determined, broke after being subjected to stress for a period of 15 months when annealed, while hard wire carrying 85 per cent. of the maximum temporary load remains unbroken after 17 months. It is seen that these results are the same in kind as those obtained by Vicat, and confirm the conclusion that heavily loaded iron, as well as other metals and the woods, are likely to yield ultimately under loads that are sustained for short periods of time without apparent injury. This fact has been amply proven by earlier investigators; but the difference above observed between hard and soft iron has, so far as Professor Thurston has been able to learn, never, until now, been discovered.

#### Tests of Rail Joints.

A correspondent of the Railroad Gazette gives some interesting particulars relating to experiments with rail joints recently made at the works of the Bethlehem Iron Co. Three joints were tested: 1. The standard joint of the Lehigh Valley Railroad, made with the Fritz & Sayre angle joint-bar. 2. The standard joint of the Pennsylvania Railroad, which uses a modification of the Fritz & Sayre joint-bar. 3. The standard joint of the Lehigh Valley, except that the ends of the rails were cut at an angle of 60°. Short pieces of rails of 57 pounds per yard with the joint bars were furnished by the Bethlehem Iron Co. for No. 1 and No. 3, and by the Pennsylvania Railroad Co. for No. 2. The bearings were placed exactly 2 feet apart, and the pressure applied in the center immediately over the ends of the rails, which were left about 3-16th inch apart. The weight of the Lehigh Valley joint-bars was 40 pounds per pair, and of the Pennsylvania 36 pounds per pair. The tests were made by Mr. Maunsel White, of the Bethlehem Iron Co., on one of Rishle's improved testing machines. The accompanying table shows the deflections in each joint due to the pressure applied:

Power applied. Pounds.	Deflection.			
	Penn. R. R. joint, inches.	R. L. V. R. joint, inches.	Miter joint, inches.	Feet joint, inches.
10,000	.009	.005	.015	
12,000	.003	.003	.021	
Load removed.	.008	.003	.005	
15,000	.008	.040	.034	
17,500	.073	.039	.044	
20,000	.110	.054	.054	
22,500	.117	.058	.055	
25,000	.154	.070	.060	
27,500	.184	.085	.077	
30,000	.149	.108	.088	
Load removed.	.135	.0	.040	
35,000	.064	.195	.109	
35,000	.064	.160	.122	
Heads of rails came together.				
37,500		.215	.169	
40,000		.273	.185	
42,500		.305	.208	

\* Neglected to record this.

#### Conductivity of Carbon.

A contribution to the theory of the carbon telephone transmitter is to be found in recent researches by Messrs. J. Probert and A. W. Soward. It has long been known that carbon has the power of absorbing and condensing gas within its pores, and also that resistance of carbon powder to an electric current through its mass is not a true resistance, but may be resolved into two factors—namely, the true resistance of the carbon particles and the resistance of or disturbance occasioned by the gas or air confined within the existing spaces. In blocks of solid carbon the air spaces are naturally smaller, and the resisting or disturbing influence is weaker than in the case of carbon powder, but still it exists, and the experiments of the gentlemen above mentioned prove that the conductivity of porous carbon in different gases at different pressures varies with the chemical nature and density of the absorbed gases.

#### Utilization of Blast-Furnace Slag.

Mr. A. D. Elber, of Hoboken, N. J., has applied for letters patent for the conversion of blast-furnace slag into desulphurized silicates, and the preparation of the silicates for use in the manufacture of china, statuary, fine cements, &c. Mr. Elber starts with the production of mineral wool from slag by the injection of steam into the slag while in a fluid state. The most remarkable features of this new process are: 1. That it allows of adjusting the air volume in the fibrous slag to the most desirable proportion for perfect reduction. 2. That, while ground or granulated slag will be found very difficult of treatment, the fibrous slag can be converted into desulphurized silicates with almost absolute certainty by uncomplicated, rapid and comparatively inexpensive treatment. The fibrous slag is commercially known in England as slag wool or silicate cotton, and in the United States as mineral wool, which latter name will be adopted for fibrous slag in the following description of experiments. The presence of soluble sulphur in mineral wool is detected by testing with acidulous liquids; ordinary writing ink is a convenient re-agent, and if it is brought in contact with the wool the well-known smell of sulphuretted hydrogen will be readily noticed. A Hessian crucible is filled with such wool,



# H. D. SMITH & CO.,

## Plantville, Conn.,

Manufacturers of the

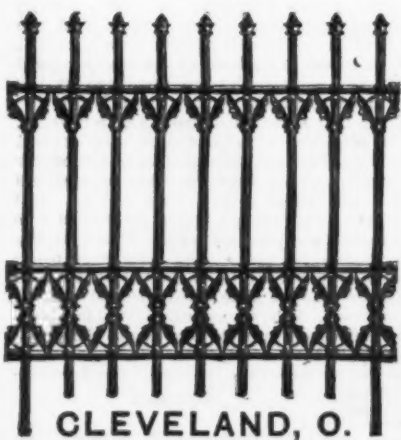
## BEST QUALITY CARRIAGE MAKERS' HARDWARE,

Manufacture the Largest Variety of Forge Carriage Irons, of Best Material and Workmanship.

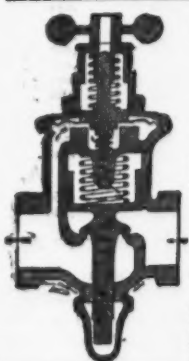
PRICES LOW FOR QUALITY OF WORK FURNISHED.

SEND FOR PRICE LIST.

**VAN DORN IRON WORKS,**  
SOLE MANUFACTURERS OF THE  
**Cleveland Wrought Iron  
Fence,**



**CLEVELAND, O.**  
The best and cheapest Fence manufactured. Over 1,000,000 feet now in use. Send for catalogue and estimates. (Please mention this paper.)



**CURTIS  
PRESSURE  
REGULATOR,**  
FOR  
STEAM and WATER,  
is made entirely of metal;  
occupies the same space as  
a globe valve. It has no  
packing or packing, and is a  
lock-up valve. Write for  
circular. Manufactured by  
Curtis Regulator Co.,  
61 Beverly St., Boston, Mass.  
General Agencies: 109 Liberty  
St., N. Y.; 98 Market St.,  
Phila., Pa.; 30 Market St.,  
Chicago, Ill., and cor. Hall  
day and Saratoga sts., Balti-  
more, Md.

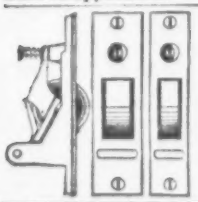
**COBB & DREW**  
Plymouth, Mass.,

Manufacturers of Copper, Brass and Iron Rivets;  
Common and Swedes Iron, Leathered, Carpet, Lace  
and Gimp Tacks; Finishing, Hungarian, Trunk,  
Clout and Cigar Box Nails, &c. Rivets made to  
order.

NEW YORK AGENCY,  
**GRUNDY & DISOSWAY,**  
HARDWARE,  
165 GREENWICH STREET,  
Agents for the Philadelphia Star Carriage and Tire Bolts.



**ROMER & CO.,** Manufacturers of Patent Jail  
Padlocks, Brass and Iron Padlocks, Carriage  
Lamps and Lanterns, 28 to 42 Summer Avenue,  
Newark, N. J. Illustrated catalogues sent to the  
trade on application.



**HUGUNIN SASH BALANCES,**  
3 sizes, made with 802  
improvements. Genuine  
Hugunin Balances have  
my name cast upon them  
as "Patentee and Solely  
Authorized Maker," and  
dates of patents on the  
boxes containing same.  
Buy no other. Send orders  
direct to factory for fac-  
tory prices. Address  
**Robt. B. Hugunin,**  
Hartford, Conn., U. S. A.

**MINERS' CANDLES,**

Superior to any other Light for Mining

Purposes. Manufactured by

**JAMES BOYD'S SON,**

Nos. 10 & 12 Franklin St., New York.



**SARANAC HORSE NAIL CO.,**

PLATTSBURGH, N. Y.

A. WILLIAMS, Pres't and Treas. S. F. VILAS, Vice-Prest. W. S. GUIBORD, Sec'y.

AGENTS:

**ELY & WILLIAMS, Philadelphia and New York.**

**S. H. & E. Y. MOORE, Chicago.**

**SLIGO IRON STORE CO., St. Louis.**

**S. G. B. COOK & CO., Baltimore.**

Correspondence Invited.

**Eureka Patent Shear**

For Cutting Round and Flat Bar Iron and Sheet Metal.

MADE ENTIRELY OF CAST STEEL.

Cheapest and best tool for the purpose

ever put on the market.

Send for Descriptive Circular.

**EUREKA SHEAR CO.,**

811 Market St., Philadelphia, Pa.

Office and Factory, Cor. Easton and Barton Streets, ST. LOUIS.

**SHULTZ BELTING COMP'Y,**

MANUFACTURERS OF

**SHULTZ PATENT FULLED LEATHER BELTING AND LACE LEATHER.**

Our BELTING is made of Leather, tanned on the surfaces only: the interior (which is the fiber and strength of the hide) is not tanned, but Rawhide fulled and softened by our patented process. Our Belting is more pliable, and hugs the pulley better, and transmits more power than any other belt. Our Rawhide Lace Leather and Belt Grease are the best in use.

**VALVES FOR FURNACES AND IRON WORKS.**

We make out of our Patent Leather, Valves for furnaces, which we claim last five times as long as any other. We will furnish for trial \$5 worth, without charge, to each of the first ten parties sending us sizes. We also send a useful little book on Belting free, on application.

Agents in all Important Cities.

**THE GILBERT & BENNETT MFG. CO.**

Georgetown, Conn.,

Manufacturers of

**Iron Wire, Sieves and  
Wire Cloth,**

Power Loom Painted Screen Wire Cloth

GILBERT'S RIVAL AND SIEVE

Galvanized Twist Wire Netting.

WAREHOUSES

42 Cliff Street, New York.

**CLEVELAND FLUE CLEANER MANUFACTURING CO.,**

The most simple, durable  
and economical  
steam flue cleaner.



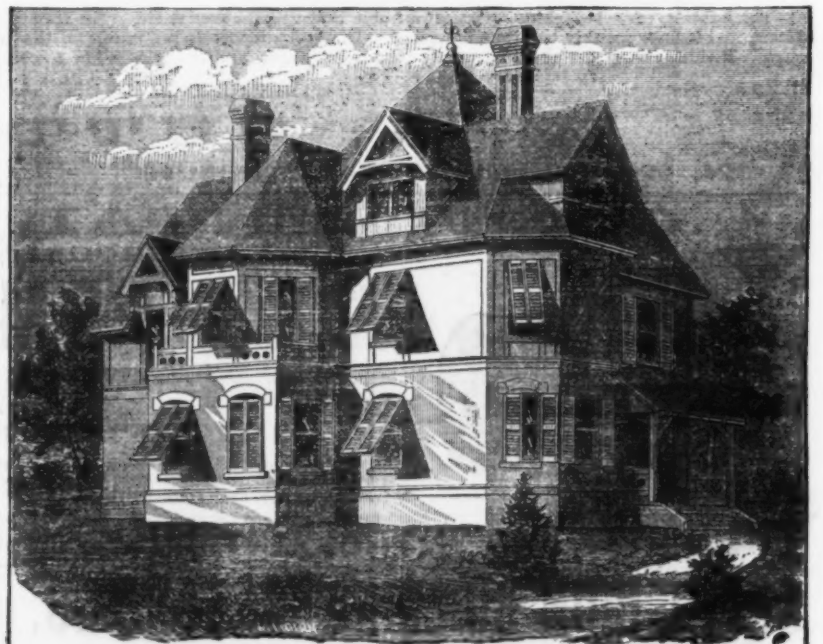
It saves  
from 15 to 25 per cent.  
in labor and fuel.

Send for Circular and Price List of Cleaner and Hose.

22 & 24 POWER BLOCK, CLEVELAND, O.

**THE AUTOMATIC BLIND AWNING FIXTURE,**

Attachable to old as well as new blinds on FRAME or BRICK houses.



**F. O. NORTH & CO.,** Manufacturers, Boston, Mass.

**H. F. SISE, (New York Warehouse),** 100 Chambers St., New York.

**NEW HAVEN HORSE NAIL CO.**

WE GUARANTEE  
ALL NAILS  
SUPERIOR IN  
QUALITY.

TRADE  
MARK

PERFECT IN  
DRIVING  
UNEXCELLED  
IN FINISH.

**FORGED POINTED FINISHED**

FOR SALE BY  
**ELY & WILLIAMS, 178 1/2 Water Street, New York.**  
**RUNYON & HALLETT, 103 Chambers St., New York.**

**WELLS' PATENT UNBREAKABLE**

A. C. WELLS & CO., Patentees, Market St., Manchester, Eng.

Adopted in the English Government and finest

works and Steamship Co's. in the

WORLD.

Over 150,000 Cast

in first two years, superced-

ing all others.

SOLE WHOLESALE

AGENTS FOR THE

UNITED STATES,

**PAINE, DIEHL & CO., 7 Strawberry St., PHILA., PA.**

AGENTS WANTED EVERYWHERE. LIBERAL TERMS.

**LAMPS & OIL FEEDERS.**

Entirely superseding tin goods, as

they DO NOT LEAK or BREAK!!

In writ-

ing please

mention

this

paper.

WRITE FOR LISTS,

And ask your furnisher to

get you them.

**The Farrel Foundry and Machine Co.**

ANSONIA, CONN.,

Manufacture improved

**ROCK & ORE**

**BREAKERS,**

(The "BLACK" STYLE,

designed for breaking to small

pieces and one-third dust all kinds

of hard and brittle substances, such

as Quartz, Emery, Gold and

Silver Ores, Coal, Plaster,

Iron, Copper and Lead Ores;

also, Stone for making Concrete

and Railroad Ballast.

View of Rock Breaker.

Twenty years of practical test, at home and abroad, has proven this machine to be the best one

ever invented for the purpose. Mr. S. L. HANSEN, for the past fifteen years connected with the manufacture

of these machines, has charge of this department of our works, and will personally superintend their erec-

tion within a reasonable circuit. Gold Medal awarded at the Massachusetts Mechanic Association, 1883

and Silver Medal (special) at American Institute, New York, 1884.

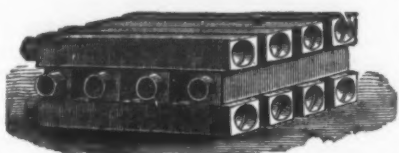
**COPELAND & BACON, General Agents, 55 Liberty St., New York.**





A. WYCKOFF,

Manufacturer of



CHAIN PUMP TUBE

Special prices to the wholesale trade for the next 30 days.

122 Railroad Avenue, ELMIRA, N. Y.

R. COOK &amp; SONS,

Manufacturers of

Carriage &amp; Wagon AXLES,

WINSTED, CONN.

ESTABLISHED 1839.

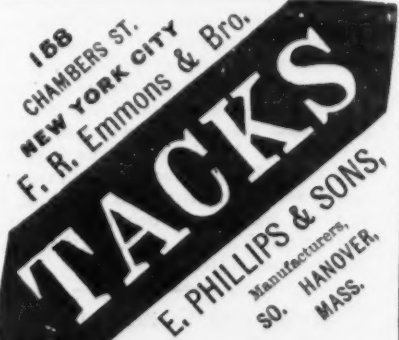
N. Y. MALLET and HANDLE WORKS



Manufacturers of

Calkers', Carpenters', Stone Cutters',  
Tin, Copper and Boiler Makers'

MALLETs,

Hawing Beets, Hawing and Calking Irons;  
also all kinds of Handles, Sledge, Chisel and Hammer Handles, AlsoCOTTON AND PALE HOOKS.  
Patented Feb. 15, 1871 a new combination of Hooks.  
456 E. Houston St. New York City.WHIPPLE MFG. CO.,  
CLEVELAND, O.Builders' Hardware,  
DOOR LOCKS & KNOBS  
AND  
Fine Bronze Trim-  
mings.

WALDRON &amp; SPROUT,

Manufacturers of

Saw's Double and

Single Shear

Horse Hay Forks

And

Sprout's

HAY ELEVATORS,

PULLEYS and

GRAPPLES.

Send for Circulars.

Honey, Lycoming Co. Pa.

Keystone Screw Co.,

17th and Venango Sts., PHILADELPHIA.

J. BILLERBECK,

Manufacturer of

Iron Gimlet-Pointed Wood Screws.

## REMOVAL.

THE

NEW YORK BELTING AND  
PACKING COMPANY,

MANUFACTURERS OF

Rubber Belting, Packing  
and Hose,

HAVE REMOVED TO

Nos. 13 and 15 Park Row,

(OPPOSITE ASTOR HOUSE)

NEW YORK.



BUCK BROTHERS, Millbury, Mass.

The most complete assortment in the U. S. of

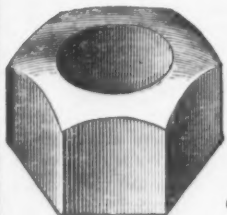
Shank, Socket Firmer and Socket Framing Chisels.

PLANE IRONS.

CAUTION.—Buyers should be on their guard and not have inferior goods palmed on them by unprincipled persons, who represent them as our make. Our tools are stamped "BUCK BROTHERS," and our labels have on our trade-mark also "Riverlin Works."

## PHOSPHOR-BRONZE

FOR

BEARINGS, SLIDE VALVES, CYLINDER RINGS,  
CROSS-HEAD GIBBS, STEPS, BUSHINGS,And all purposes where Maximum Durability, Anti-Frictional  
and Non-Cutting Qualities are Desirable.PUMP RODS,  
BOLTS & NUTS,  
MACHINE and WOOD  
SCREWS, &c., &c.Combine Toughness, Strength, Durability and  
Resistance to Corrosion.

TRADE



MARKS

"Phosphor-Bronze."

CASTINGS OF ALL KINDS TO ORDER.

SEND FOR PAMPHLET AND PRICES.

THE PHOSPHOR-BRONZE SMELTING CO., LIMITED,

No. 512 Arch St., PHILADELPHIA, PA.

Owners of the U. S. Phosphor-Bronze Patents. Sole Manufacturers of Phosphor-Bronze in  
the United States.

using little more pressure than is necessary in stuffing a pipe with tobacco; the crucible is then placed into the fresh-glowing coal fire of a stove or range and allowed to remain there about an hour. It will then be found to contain, beginning at the bottom:

1. Fused desulphurized slag, forming the crust of

2. A fritted, porcelain-like mass, often spotted with iron oxides.

3. A mass of whitish, soft silicate, containing some impurities.

4. Greenish, sensibly sulphurous, partly opened silicates.

5. A spongy, dark mass, in which the fibers are yet discernible.

6. On top: Nearly unchanged mineral wool

By reheating No. 4, No. 3 is obtained; Nos. 5 and 6 may be reduced in the same ratio, and if the heat is just sufficient the whole charge may be converted in one heat to the most desirable condition, which for most purposes is that of the No. 3 specimen. This desulphurized and easily friable silicate is finely pulverized, and after being purified by washing is then ready for use in the arts, as slag-silicate of lime, alumina and magnesia. Its color is pure white; if it has a darker shade it may not have been thoroughly desulphurized, as the testing with acid will show. Mixed with water only, the silicate may be cast in molds, but it will scarcely be sufficiently plastic to be formed by hand, unless a more aluminous earth or clay is added. The plasticity of the silicate may, however, be brought to a high degree after treatment with diluted sulphuric acid, and if the acid solution is not used to excess it is presumed that its chemical action will be mainly confined to the formation of sulphate of lime and to the proportionate setting free of silica.

For quick preparation the silicate is sparingly moistened with a strong solution of four parts, by weight, of water to one part of acid, when the formation of sulphate of lime is readily noticed. After slight stirring and quick washing with more water, the latter is drawn off until the mixture becomes lustrous and apparently nearly dry. It is then ground for about a minute in a mortar, the luster reappears, the mass becomes viscid like putty, and can then be formed and air-dried at ordinary temperature. If the mass contains unneutralized acid, and is put away for weeks, then broken up, soaked in pure water and worked over, its plasticity and fineness have increased. The hard-fritted and the partly fused specimens (Nos. 1 and 2) are not easily attacked by acids, but after mixing in finely ground or sand-like condition, cementation will set in gradually and the mass will become very hard. The roasting and desulphurizing process is also applicable, if mineral wool has first been soaked in a solution of starch in water and then dried, or if it has been coated or impregnated by condensation of hydrocarbon vapors from heated asphaltum, &c. In both preparations carbonization and burning of the carbon will set in during roasting; the comparative advantages of either admixture are, however, not yet determined. If Mr. Elber succeeds in eliminating the dangers that beset all porcelain masses containing iron in any combination whatsoever, he has very likely succeeded in the production of a valuable commercial product.

## Tornadoes.

Sergt. John P. Finley, Signal Service officer at Kansas City, Mo., has published, in a pamphlet on tornadoes, some useful directions concerning the course to be taken to escape the attending danger. The inhabitant of a tornado-frequented district must be watchful in the season of visitations, for he can never know when the destruction will come upon him. On the first sign of the approaching vortex he must run—always to the north, unless by going in that direction he will have to cross the entire path of the storm. If he is nearer to the southern edge than to the center of the probable path, he may go south, bearing slightly east; but in no event should he ever run directly to the east or northeast. It is impossible to save any building that may lie in the path of the tornado, or any property that cannot be got out of its way. No material, no method of construction, can be competent to resist the raging destruction. Nothing rising above the ground can escape it. The most practicable measure of precaution is to construct a "dug-out" at some suitable point, within easy distance from the house, to serve as a place of refuge or shelter. The retreat should be entirely underground, with a roof at least 3 feet thick, not rising above the surface of the earth, and entered from the northern or eastern side. A "cellar-cave" may be constructed from the cellar, if the house has one, to serve as a substitute for the "dug-out." It should be excavated from the west wall of the cellar, toward the west, and should be made as complete and secure as the "dug-out." If, however, the storm cannot be escaped, if no refuge is at hand, or there is not time to get to it, the safest thing to do is to place one's self against the west wall of the cellar, face forward, or against the south wall, as near the southwest corner as possible. The northeast quarter is in any case a fatal position, and should always be avoided. If one is actually overtaken by the tornado, his only resource is to cast himself face downward upon the ground, with his head to the east and his arms thrown over his head to protect it. If a stump or large stone, or anything heavy, that the wind will not blow over, is near, he may get a trifle of protection by throwing himself to the eastward of it. If in a house with no cellar, he should get into the west room, on the ground floor, if possible, and away from all stoves and heavy furniture. The people of towns might find it to their advantage to provide for having a watch, to be on duty on all days when the air bears the premonitory symptoms of a violent wind-storm, to give a signal to the whole population on the appearance of the first real threatening signs. The signs of the formation and approach of a tornado cloud are distinct and sufficiently suggestive to afford opportunity for timely and concerted action. Sergeant Finley is continuing his investigations of the phenomena of tornadoes, and he has prepared three full schedules of minute inquiries calling for the facts attendant upon the appearance of the storms, which he sends to persons who were within

the path of one, who were on the outer edge of the path, and who were from 10 to 100 miles from it.

## OBITUARY.

WALTER J. MORRIS.

Walter J. Morris, who died of pneumonia at St. Luke's Hospital, Wednesday evening of last week, was a man with a very interesting history. Born in Richmond, Va., 47 years ago, he early showed great fondness for mathematics and engineering. While but a boy he was employed on extensive surveys, and one of his first feats was to lay out the town of Manchester, on the James River, opposite Richmond. Then he went to Missouri and surveyed the Iron Mountain Railroad, of which he became the chief engineer. Next he was employed as engineer for the town of Paducah, on the Ohio River. When the Civil War broke out he was appointed chief engineer on Gen. Albert Sidney Johnston's staff, and came very near being killed when his commander fell at the battle of Shiloh. His bravery and general ability attracted so much attention that he was promoted to command the engineers on General Polk's corps, which was the largest corps in the Confederate army. His next position was chief of engineers in Gen. Dick Taylor's department, which included Alabama, Mississippi and Louisiana. At the close of the Rebellion Mr. Morris went to South America and assumed a prominent part under General Meigs in building two lines of railway for the Peruvian Government, in the Andes. It is now said that that Government owes him 2½ per cent. of \$27,000,000 for his services as engineer, contractor, &c. From South America he went to Turkey and took part in certain breech-loading-rifle negotiations, and afterward he surveyed a railway for Turkey through the Balkans. Then he came to New York, projected the Broadway underground railway, was the engineer of the South Ferry and direct-transit enterprise in Brooklyn; also of the Huntsville, New Orleans and Western Texas road. Just before his death the Turkish Government was negotiating with him to resume charge of his old railway system in Turkey.

WILLIAM MASON.

William Mason, proprietor of the Mason Machine Works, died May 21, at Taunton, Mass., aged 76 years. He was a native of Mystic, Conn., and early developed a wonderful mechanical genius. He went to Taunton in 1836, and soon after invented the self-acting mule, now universally used in cotton spinning. In 1842 he became owner of the works of Crocker & Richmond, his employers, and he gradually extended them, until now they employ 1000 men and manufacture all sorts of machinery, including locomotives, printing presses, cotton machinery, machinists' tools, furnaces, &c. The business passes into the hands of his sons.

**Demand for Farm Implements in the Northwest.**—A letter from San Francisco says that business has increased greatly during the past year, and especially as regards trade with Oregon and Washington Territory. The impetus which it has received is consequent upon the large immigration of practical farmers who have taken up small farms there, and who are the principal purchasers, either directly with firms in San Francisco or through agencies in the northwest. A representative of a large Eastern house stated that shipments to Oregon and the north generally had increased fully 50 per cent. during the past 10 months, and that trade at the present time is unexampled. The demand was principally for farm wagons, plows and headers, which were forwarded by fast freight. If it were possible to carry on the business of supplying the wants of immigrants on easy installments, he had no doubt the demand would severely tax the supply, but the great drawback to this would be the difficulty of finding proper security for final payment for the articles shipped by manufacturers of agricultural implements. It is understood that the business is assuming great proportions, and that the field is daily growing more important. This view of the situation is borne out by an inspection of cargoes going north, as all Portland steamers for the past six weeks have carried large quantities of farming implements, including threshers, plows, wagons, &c., consigned to firms in Portland.

Immigration flows in briskly at Castle Garden, but Secretary Jackson, of the Emigration Commission, adheres to the opinion, expressed earlier in the season, that the total will fall short of last year's about 100,000. The total for all the ports in the United States for the ten months ended April 30th compares with the corresponding period last year as follows:

England and Wales	1884	1885
Ireland	46,972	53,713
Scotland	36,310	46,339
Austria	11,123	13,581
Germany	6,973	13,609
Italy	14,226	15,001
Norway	20,505	24,071
Sweden	12,539	10,225
Denmark	21,331	33,594
Prussia	38,40	73,917
All other countries	57,347	73,483
Total	417,689	544,601

As will be seen from the above, Germany sends nearly three to one, compared with Ireland. Political difficulties in Ireland have as yet had no appreciable effect on the movement of population. The general condition of emigrants arriving, physically and financially, continues up to a fair average.

An exceedingly large blue-print frame is used at one of the Northern Pacific Railroad shops. The glass is a heavy plate, measuring 4 x 8 feet. It is bedded in a frame that swings on trunnions and is adjustable in any direction. It is mounted on a carriage running on a track, and can easily be run in and out of the blue-print room, where all the work of preparing and making the blue prints ready is done.

A national Hungarian exhibition is projected to be held in Buda-Pesth in 1885. The Government, it is said, has already promised a subsidy of 400,000 florins (about \$162,000).



# The Iron Age

Metallurgical Review.

New York, Thursday, May 24, 1883.

DAVID WILLIAMS, Publisher and Proprietor.  
JAMES C. BAYLES, Editor.  
JOHN S. KING, Business Manager.

## RATES OF SUBSCRIPTION, INCLUDING POSTAGE.

THE UNITED STATES, BRITISH AMERICA AND SANDWICH ISLANDS.  
Weekly Edition ..... \$4.50 a year.  
Issued every THURSDAY morning.  
Semi-Monthly Edition ..... \$2.30 a year.  
Issued the FIRST and THIRD THURSDAY of every month.  
Monthly Edition ..... \$1.15 a year.  
Issued the FIRST THURSDAY of every month.

TO ALL OTHER COUNTRIES.  
PER ANNUM, POSTPAID.  
Weekly Edition: \$10.00—£1—25 francs—30 marks—12  
dollars—6 roubles (coin)—24 lire—20 pesetas.  
Semi-Monthly Edition: \$5.00—£1—12½ francs—15  
marks—6 roubles—12 lire—10 pesetas.  
Monthly Edition: \$2.50—£1—6½ francs—8 marks—3  
dollars—6 roubles (coin)—6 lire—5 pesetas.

REMITTANCES  
should be made by draft, payable to the order of David  
Williams, on any banking house in the United States or  
Europe; or, when a draft cannot be obtained, in  
postage stamps of any country.  
NEWSDEALERS OR BOOKSELLERS  
in any part of the world may obtain *The Iron Age*  
through the American News Company, New York, U.  
S. A.; the International News Company, New  
York, U. S. A.; and London, England; or the San Fran-  
cisco News Co., San Francisco, California, U. S. A.

RATES OF ADVERTISING.  
One square (12 lines, one inch, one insertion, \$2.00;  
one month, \$7.50; three months, \$20.00; six months,  
\$35.00; one year, \$60.00; payable in advance.

### BRITISH AGENCY.

Office of THE IRONMONGER, 448 Cannon St. London.

DAVID WILLIAMS, Publisher,  
53 Rensselaer Street, New York.  
PITTSBURGH, 77 Fourth Avenue.  
JOS. D. WEAVER, Manager and Associate Editor.  
PHILADELPHIA, 220 South Fourth Street.  
THOS. HOBSON, Manager.  
CHICAGO, 36 & 38 Clark St., cor. Lake.  
HENRY SMITH, Manager.  
CINCINNATI, 15 West Fourth Street.  
CHATTANOOGA, Fifth and Market Streets.  
B. R. LOWE, Manager.

SOLE AMERICAN AGENCY FOR  
THE IRONMONGER,  
Published at 448 Cannon St., London.

The oldest and leading representative of the British  
Iron and Hardware Trades.  
Subscription, postpaid, ..... \$5.00  
to countries outside of Great Britain, including  
Monthly Foreign Supplement of one copy of Iron-  
monger's Diary.

By a mutual clubbing arrangement between the  
two journals, subscriptions to both will be received  
by either *The Ironmonger* or *The Iron Age* on the fol-  
lowing terms:  
THE IRONMONGER AND THE IRON AGE, Weekly,  
in the United States and Canada ..... \$7.50 or £1.10  
in Great Britain and Ireland ..... 5s 0d or 1s 2d  
in other countries ..... 8s 0d or 1s 12d  
THE IRONMONGER, Weekly, and THE IRON AGE,  
Monthly.  
in the United States and Canada ..... \$1.75 or 2s 6d  
in Great Britain and Ireland ..... 1s 2d or 2s 0d  
in other countries ..... 2s 6d or 5s 0d

### CONTENTS.

First Page.—Interesting Relics for the Chicago  
Railway Exposition. The Oldest Alpine Tunnel.  
New Rail Cambering Arrangement.

Third Page.—New Rail Cambering Arrange-  
ment (Continued).

Fifth Page.—Some Points About Boilers.

Seventh Page.—Some Points About Boilers  
(Continued). Latest Legal Decisions. Spontaneous  
Combustion of Coal.

Ninth Page.—English Iron and the American  
Market. Wind Pressures. New Hand Shear for  
Cutting Flat and Round Iron. Driven-Well  
Patents.

Eleventh Page.—Driven-Well Patents (Conclu-  
ded). Scientific and Technical.

Thirteenth Page.—Scientific and Technical  
(Continued). Obituary. Demand for Farm Im-  
plements in the Northwest.

Fourteenth Page.—The Pig Iron Production of  
the Northeast. Direct Processes. The Outlook  
in the Lead Market. The Labor Situation West.  
Arbitration in Pennsylvania.

Fifteenth Page.—The Driven-Well Patents.  
The Congressmen on the Labor Situation. A  
Visit to the Hudson River and Chateaugay Mines.

Sixteenth Page.—A Visit to the Hudson  
River and Chateaugay Mines (Continued).

Nineteenth Page.—A Visit to the Hudson  
River and Chateaugay Mines (Continued). The  
Du Puy Direct Process. Industrial Items. Opening  
the East River Bridge.

Twenty-first Page.—Trade Report—British  
Iron and Metal Markets. Financial.

Twenty-second Page.—Financial (Conclu-  
ded). General Hardware. Iron. Metals. Coal  
Old Metals. Paper Stock. &c. Imports. Exports.  
Foreign Trade Movements.

Twenty-third Page.—Foreign Trade Move-  
ments (Continued). Philadelphia. Pittsburgh.  
Chicago. Chattanooga. Cincinnati. Louisville.  
St. Louis. Baltimore.

Twenty-fourth Page.—Baltimore (Continued).  
Richmond. Our English Letter. Foreign. Under-  
ground Electric Wires. Standard Test of Car  
Wheels. Locomotive Building.

Twenty-fifth Page.—Washington Letter.  
Sunday Railway Work.

Thirty-first Page.—The Iron Age Direc-  
tory.

Thirty-second Page.—New York Wholesale  
Prices.

Thirty-fourth Page.—New York Wholesale  
Prices (Continued).

Thirty-fifth Page.—New York Wholesale  
Prices (Continued).

Thirty-sixth Page.—Philadelphia and Pitts-  
burgh Hardware and Metal Prices.

Fortieth Page.—Boston Hardware and Metal  
Prices.

## The Pig Iron Production of the Northeast.

An examination of the statistics of the production of pig iron in the United States discloses the singular fact that in the production of this essential raw material the Northeastern part of the country is not keeping pace with the growth of the nation generally. It is not necessary to cite statistics to prove that the consumption of pig iron in New England, New York and New Jersey is now very much greater than it was ten years ago, for the fact is apparent to everybody. Foundries of all kinds have been built, enlarged and improved in this part of the country to such an extent that the daily consumption of pig iron is far beyond what it was in 1872. The consumption in rolling mills has also increased, but not in the same ratio. The natural territorial sources of pig-iron supply for the Northeast are the New England States, New York, New Jersey and the Lehigh Valley of Pennsylvania. That these sources have not made much progress in production in the past ten years is shown in the following table of their total yearly production, compared with that of the United States:

Years.	Net tons.	Per cent. of the U. S.
1872.....	866,634	30
1873.....	811,799	28
1874.....	732,087	26
1875.....	635,945	23
1876.....	478,010	17
1877.....	621,154	27
1878.....	738,882	28
1879.....	702,213	26
1880.....	1,129,531	36
1881.....	1,108,208	34
1882.....	1,211,570	33

In the Northeast the increased production of 1882 over that of 1872 is only 40 per cent. The production of the United States in the same time increased from 2,854,558 tons to 5,178,122 tons, or over 80 per cent., which is twice the rate of increase in the Northeast. The State of Pennsylvania alone in that time increased from 1,401,497 tons to 2,449,256 tons, or 75 per cent. It seems very singular that this Northeastern district, which is very rich in iron ore, and is at no point too distant from sources of fuel supply, should not show greater progress in the production of crude iron. The stove founders, the machine manufacturers, the hardware makers, all are heavy consumers of pig iron, and it would seem to be natural that their neighbors, the pig-iron manufacturers, would endeavor to fully supply their wants and shut out all competitors who have to send their product over long distances to reach this market.

Not only have Scotch and English furnaces made inroads upon the trade of this section, but so also have Southern pig-iron makers, even though they have to pay heavy rates of freight to reach New York and New England. Some Western pig iron also finds its way here. There is no trouble about the quality of the home-made article, for any quality can be produced that may be desired. There seems to be a willingness to permit other manufacturers to enjoy this field, which is shown in the disposition to maintain very high prices, comparatively speaking, and the reluctance with which prices are reduced when outside competition becomes dangerously strong. We see this to-day, when furnaces along the Hudson River and in the Lehigh Valley are being blown out rather than turn out pig iron to be sold at lower prices than outsiders could compete with. We will doubtless see a greater shrinkage in the production of pig iron in the Northeast for some time than elsewhere, simply because our home producers choose to relinquish the market to outside makers rather than to introduce greater economies in the management of their furnaces and sell their pig iron at still lower prices.

This will only be following the plan pursued during the depression of 1873-79. During that gloomy period the annual production of pig iron in the United States fell off 27 per cent. from the year of greatest output to the year of extreme depression, but in the Northeastern district the production made a much greater plunge, falling off 45 per cent. It cannot be possible that in this district the consumption of pig iron fell off more heavily than it did in other parts of the United States. It would therefore seem that the pig-iron producers of this section made less effort to hold their home market than did the manufacturers of pig iron in other sections. There is need of more enterprise in the management of our home furnaces, though it must in fairness be stated that we have a number of them which are well equipped and admirably conducted, and which are therefore always found at work under any circumstances. But in the South and West very many furnaces are rapidly introducing fire-brick stoves and large blowing engines and other modern and progressive appliances, while too many of our Northeastern iron makers are contented to run along with the same old plant year after year as long as they can sell their product for more than it costs them, and then to blow out and lie idle whenever the price falls below that cost. Now is the time to put forth every effort to seize and hold the home market against all comers. If pig iron must be made cheap, which seems to be inevitable, preparations should be put on foot to meet the changed conditions.

It is stated that the New York Central Railroad management is still receiving from Bolckow, Vaughan & Co. steel rails on an old order at \$62 per ton. Mr. Vanderbilt's

cleverness in this matter was widely commented on at the time he placed his orders abroad, but somehow we do not seem to hear as much about it now as we did then.

### Direct Processes.

Elsewhere we publish a very interesting letter in defense of direct processes in general, and of the Du Puy process in particular. Since our comments upon a communication from Mr. Menzies relative to the use of magnetic-iron sand in the Siemens direct process have served our correspondent as a text—or perhaps pretext—for his letter, we shall endeavor to dispel the wrong impression which we have—indeed, quite unintentionally—conveyed to him.

In the article in question we said, and are quite prepared now to repeat, that the chemical results of direct processes have always been good, and the commercial results mostly bad. Our correspondent concedes that the first part of this statement "is quite correct," and goes on to say: "The only point not yet satisfactorily settled in the judgment of manufacturers is the certainty of commercial economy." Evidently there is thus far no issue between *The Iron Age* and Mr. Du Puy. We said, moreover, in concluding the editorial he expects to, that the more general adoption of the direct process in this country is as yet too much hemmed in, as it were, by the cost of ores and labor and the remoteness of the coal from the ore, &c. Mr. Du Puy, after describing his process and giving results that might have been obtained at Safe Harbor under other than the conditions then existing, concludes by saying: "I am prepared to show that with a properly arranged and systematized plant, located at a point where material may be obtained at moderate prices, the cost of direct iron in blooms will likely be very little over the cost of pig iron." Precisely, and, as we said, under exceptionally favorable circumstances the direct process may prove a commercial success. In the meantime, however, it must not be forgotten that by the use of the Danks-Bouvard puddling furnace, pig containing 0.82 per cent. phosphorus can be made into iron containing not more than 0.082 per cent. of that element, and that thousands of tons of such iron have been made with a coal consumption of not more than 1161 pounds of coal per 2240 pounds of iron. Our correspondent says nothing about the loss of iron in his direct process. As the rule, we know that in the blast furnace there is no loss, in puddling a loss of about 8 per cent. and in the crucible none. In the Bessemer process the loss is slightly heavier than in puddling, while in the different direct processes the loss varies from 20 to almost 100 per cent.

Our correspondent expresses his belief that the direct process will offer a solution of the questions which the recent tariff legislation has opened, especially the one of how to cheapen the manufacture of steel in this country in order to meet English competition. Perhaps not. We have in Virginia brown ore, yielding 50 per cent. of iron, which is mined for 50 cents per ton and delivered at the blast furnace for about \$1.50 per ton. Extensive deposits of the same kind of ore are also found in Alabama and Georgia, costing about \$1.25 delivered at the furnace, and yielding from 45 to 50 per cent. of iron. The Red Mountain ore of Alabama is from a so-called fossil deposit of large extent in the midst of coal fields. It costs at the mines about \$1.25 per ton, and yields 52 per cent. of iron. In North Tennessee the same description of ore is found. Another ore bed of excellent quality is represented by the Cranberry vein in North Carolina. Nearer by we have the wonderful Cornwall ore banks, near Lebanon, and still nearer to the Hudson River Valley the Columbia County carbonates and the Chateaugay magnetites, which are quite fully described in an article printed elsewhere in this issue. Mr. I. Lothian Bell estimates the average percentage of iron in all the ore raised in Great Britain at somewhat less than 35 per cent., while the production of the American mines, similarly considered, is about 56 per cent. Less than 12½ per cent. of the English ore is fit for the Bessemer acid process, while nearly 33 per cent. of the American ore is sufficiently free from phosphorus to be used in this process. Considering, therefore, that with the high iron average of our ores (56 to 35 per cent., as against English ores), the American iron maker has 20 cwt. of ore less to handle per ton of iron produced, we think a far more promising solution of the question of foreign competition may be found in the use of the cheap ores obtainable in many localities, rather than in recourse to as yet doubtful direct processes—at least until it has somewhere been demonstrated that under conditions which exist commercial success is attainable in practical working. We are fully prepared to admit, without further demonstration, that under such conditions as might exist—in one's mind, for instance—any one of half a dozen direct processes would revolutionize iron-making in this country.

In the amended Penal Code as lately passed by the New York Legislature and approved by the Governor, Section 266 of the original act is amended to read as follows: "Section 266.—All trades, manufactures, agricultural or mechanical employments upon the first day of the week are prohibited, except that when the same are works of necessity they may be performed on that

day in their usual and orderly manner, so as not to interfere with the repose and religious liberty of the community." Under this law the question will have to be decided whether the work usually done about blast furnaces on Sunday, and which is much the same as that done on other days of the week, is necessary or unnecessary. It is possible, as experience has shown, to run a furnace without Sunday work, and there are a great many good people who strictly maintain that Sunday charging is wholly unnecessary. Most ironmasters consider it an essential condition of good working that a furnace should be charged and tapped the same on Sundays as other days, and this involves the usual amount of labor. It is interesting to note that this code makes some nice distinctions. For example, we find in Section 267: "All manner of public selling or offering for sale of any property upon Sunday is prohibited, except that articles of food may be sold and supplied at any time before 10 o'clock in the morning, and except also that meals may be sold to be eaten on the premises where sold or served elsewhere by caterers; and prepared tobacco in places other than where spirituous or malt liquors or wines are kept or offered for sale, and fruit, confectionary, newspapers, drugs, medicines and surgical appliances may be sold in a quiet and orderly manner at any time of the day." We question whether a law which thus discriminates in favor of certain lines of trade and against certain others will be of much value. It is rather loose legislation. If it is proper to prohibit the sale of merchandise on Sunday, there is no reason why a distinction should be made in favor of tobacco, newspapers, confectionary and fruits. The moral purpose of the law is defeated by such discriminations, and its hygienic purpose—if it has any—is, to say the least, impaired by them.

### The Outlook in the Lead Market.

Unusual interest attaches just now to the possible course of lead prices. So far the declining tendency has developed slowly. On glancing at former years we find prices to have ruled as under:

	1878.	1879.	1880.	1881.	1882.
January.....	4½	4½	6	5	5½
February.....	3½	4½	5	4½	5½
March.....	3½	4½	5	4½	5½
April.....	3½	3	5½	4½	5
May.....	3½	3	4½	4½	4½
June.....	3½	3½	4½	4½	4½
July.....	3½	3½	4½	4½	5
August.....	3½	4½	4½	5	5
September.....	3½	4	4½	5½	5½
October.....	3½	5½	4½	5½	5
November.....	3½	5½	5½	5	4½
December.....	4	5½	5½	5½	4½

During January of this year the price was, on an average, 4½¢, in February 4½¢, in March 4½¢, in April 4½¢, and so far this month \$4.40. The late spring has been unfavorable to the sale of lead, so that it is estimated by people in the trade that consumption in the East has fallen off one-third, as compared with what it was last year, between January 1 and the middle of May. As for white lead, the fluctuations of which exercise so powerful an influence on the lead market, it appears that the hopes of a more profitable trade during 1883, which were looked for from the meeting of corrodors held here early in the year, have so far been disappointed, causing great dullness in corrodor lead. While no actual combination was formed at the time, there was enough harmony developed to indicate less hostile competition this year than has existed for a year or two. There was some prospect, also, that a combination would eventually be formed, if any argument could induce one or two Western corrodors who stood out against such a movement to assent to any plan that could be proposed. For some time past it has been evident that there was a decided lack of harmony, not only between the corrodors of different sections, but among local competitors as well. From 7 cents, less 2½¢ per cent. to large buyers, at the opening of the year, the market has gradually settled down. Although for lead in oil a fair consumptive demand prevails, the principal corrodors are for the moment only making deliveries on old contracts. They quote 6 to 6½¢ cents. While a few corrodors refuse to sell at less than 6½¢ cents, others offer as low as 1 per cent. discount from the inside price. Dry is meanwhile inactive at 5½¢ cents. These prices are known to be very unremunerative, and may soon force makers into a combination, which would, of course, have to be formed under rigid rules, the observance of which should be guaranteed by a financial deposit. It appears that past experiences have shaken the confidence of many of the corrodors in the good faith of some of their competitors to live up to any agreement to sustain prices; hence there is clearly no remedy for the existing profitless condition of the white-lead trade, unless it come through a combination of the strictest nature to insure compliance with its terms.

Lead production in this country, so far as ascertained, is as active this year as it was in 1882, stimulated as it no doubt is in a measure by the still comparatively high price ruling. The consequence is that quite a stock of lead is fast accumulating between the extreme West and East. What the values will be when, between now and August, the holders of it get either tired or alarmed, it would be difficult to say. Indeed, the general trade outlook for the summer months is anything but cheerful when we see important branches of the industry nearly paralyzed under a notably lessened demand.

The outlook for lead seems to be no better in Europe than it is on this side. We have been told over and over again by English papers claiming authority in the matter, that below £13 Spanish lead is so ruinously low that Spanish production must necessarily be curtailed; still it goes on increasing all along, as the amounts exported show (the values are in pesetas or francs):

	Tons.	Value.
1878.....	97,842	46,263,807
1879.....	100,336	50,540,120
1880.....	92,400	45,100,899
1881.....	105,509	54,743,358
1882.....	117,133	51,650,115
Total.....	505,510	248,376,227
Jan and Feb.	14,508	6,548,164
1881.....	10,120	9,810,704
1882.....	20,450	9,112,826

Nor is Germany, the next largest lead producer in Europe, behind hand. In the years named below her production was as follows:

	Tons.	Value.
1880.....	15,228	15,228
1881.....	15,228	15,228
1882.....	15,228	15,228

Between Spanish export and German output an increase is thus shown for 1882 of about 9 per cent., about as much as we have been increasing in production ourselves year after year with the utmost steadiness. This is very good in an exceptional year like 1882, when consumption chanced to be great beyond expectations, but in a year like the current one, which seems to be destined to become a great disappointment in trade matters, at least on this side, 9 or 10 per cent. extra production without the shadow of an outlet is a serious affair, and the sooner we get duly impressed with this the better it will be for all concerned.

### The Labor Situation West.

There has been little change in the relative position of the workmen and the manufacturers in the Western iron mills since our last. The situation may be characterized as drifting—whether into a strike or out of it remains to be seen. No conferences have been held, and we understand that there is no suggestion from either side looking toward a conference. It seems now as though the scale would be presented in the Western mills on Wednesday or Thursday of the present week, and if indications are to be taken as any guide, the mills will quite unanimously refuse to sign it, and if this is so a strike seems well nigh inevitable, for if the workmen offer the present scale to the manufacturers and they refuse to sign it, what would otherwise have been a lockout would therefore become a strike, or, in other words, the manufacturers refuse the workmen's demand and therefore a strike ensues—not a lockout.

Indications from Cincinnati are that the action of the manufacturers last year, in consenting to a modification of the agreement adopted at the long strike in 1881, will have the effect that we anticipated at the time—viz., that the workmen would regard the agreement as binding only so long as it suited their conveniences, and that time has now come. It is reported that the puddlers, at the meeting held Saturday night, determined to demand the restoration of the 50 cents extra above Pittsburgh prices for boiling that was paid in the mills of the Cincinnati district up to last October, and it is intimated that the finishers will join them in this demand. If this proves true there is no doubt that the manufacturers will resist it, and therefore the strike in the West this time will include not only the Pittsburgh, Wheeling and Valley mills, but the mills of the Cincinnati district as well.

### Arbitration in Pennsylvania.

As has already been announced in these columns, immediately before the passage of the Voluntary Trades Tribunal bill by the Pennsylvania Legislature, the coal miners in the railroad mines in the Pittsburgh district made application to the Court of Common Pleas for the formation of a tribunal in the industry they represent. At that time there was a lockout in the mines, the operators demanding that the men work at 3 cents a bushel for digging, while the workmen demanded 3½¢ cents. A number of the mines were working at the reduced rate, while others were still idle. After at first refusing to join with the miners in their demand, the coal operators at a second meeting voted to join the movement, and appointed a committee of five arbitrators. The necessary authorization was made by the Court of Common Pleas, and the arbitrators met and elected John R. McCune, a well-known Pittsburgh banker, as umpire. At the meeting held Saturday night of last week the men agreed to resume work at once at all the pits, leaving the question of price unsettled, but with the understanding that, should a pay-day intervene at any of the pits before the question was settled before the board, the men should be paid 3 cents a bushel on account, and whatever price was finally fixed should be the price for digging from the resumption of work.

This certainly is a movement in the right direction, and will, if persevered in, be of the utmost benefit to the coal trade in the western part of Pennsylvania. Two previous attempts at arbitration have proved utter failures, and we imagine that under different circumstances this one would; but it seems as if the situation is such that a reduction of wages is a necessity. We believe that the arbitrator will so award, and the workmen



prefer—indeed, they are better able—to take such a reduction from the hands of the arbitrator than from the hands of a committee of their own.

#### The Driven-Well Patents.

As will be seen by an article elsewhere printed in this issue, the United States Circuit Court of Iowa has rendered a decision adverse to the Green patent in a case involving its validity. This, we believe, is the first decision adverse to the patentees which has been rendered during years of litigation in defense of their patent. But as the Circuit Court of Iowa is a court of as high jurisdiction as that of any other United States Circuit, its decision adverse to the patent may be held to be a fair offset to all the decisions which have been obtained in favor of it in other circuits.

We have not yet received a copy of the text of this decision, which we hope shortly to get, and will print in full when received. From the synopsis which has reached us we learn that the Court holds that there are two well-established instances of prior use of the principle involved in Nelson W. Green's patent, one of them being at Independence, Iowa, where a driven-well was sunk in the summer of 1861, and the other at Milwaukee, where a large number of such wells were put down as early as 1849. The Green patent was not issued until 1863. It was not until some seven years after that Colonel Green made any effort to prevent the use of his alleged discovery by the public, and it is upon this showing, more than upon the fact that the Iowa and Wisconsin wells antedated his invention, that the patent is held to be void. The court also holds that as the patent under which it is now sought to restrain infringers is a reissue which claims more than was covered by the original patent, that fact alone invalidates it under the recent decision of the United States Supreme Court defining the status of such reissues.

It is not our intention to discuss this matter editorially until the full text of the decision of the Iowa Circuit Court shall have reached us. It is, however, an important matter of news to very many of our readers, and for this reason we lay before them such facts as have already come to our knowledge. We would remind them, however, that it would be unwise to place too much confidence in the permanence of the victory which the Iowa farmers have won over the Green patent. There are at least eleven, and we believe thirteen, United States Circuit Court decisions affirming the validity of this patent, and among them a decision by Judge Blatchford, late of the New York Circuit, but now of the United States Supreme Court. In Judge Blatchford's court a case involving the validity of this patent was heard in great detail and decided very emphatically. In most of the other circuits, if we are not mistaken, Judge Blatchford's decision has had great weight in determining the ruling of their presiding judges.

An appeal will be at once taken from the decision of the Iowa Circuit Court to the United States Supreme Court, but as a decision cannot be reached in less than three years, the validity of the patent may be held to be an open question during that interval. Meanwhile we think it doubtful if the owners of the Green patent will be able to enforce their claims for royalties. They may perhaps do so in circuits in which favorable decisions have already been reached, but, pending an appeal to the Supreme Court, it is doubtful if circuit judges who have not already been called upon to pass judgment on the merits of the patent will care to hear such cases, or to issue any injunctions on the strength of decisions favorable to the patent already on record. Before the United States Supreme Court decision can be reached the patent will have expired, and in view of this fact we should think it scarcely probable that the owners of the Green patent would take any further steps to collect contested royalties. If the reports which reach us are true, their patent has already been a source of immense revenues, and, although entailing a very heavy cost in litigations, it has repaid this cost many times over.

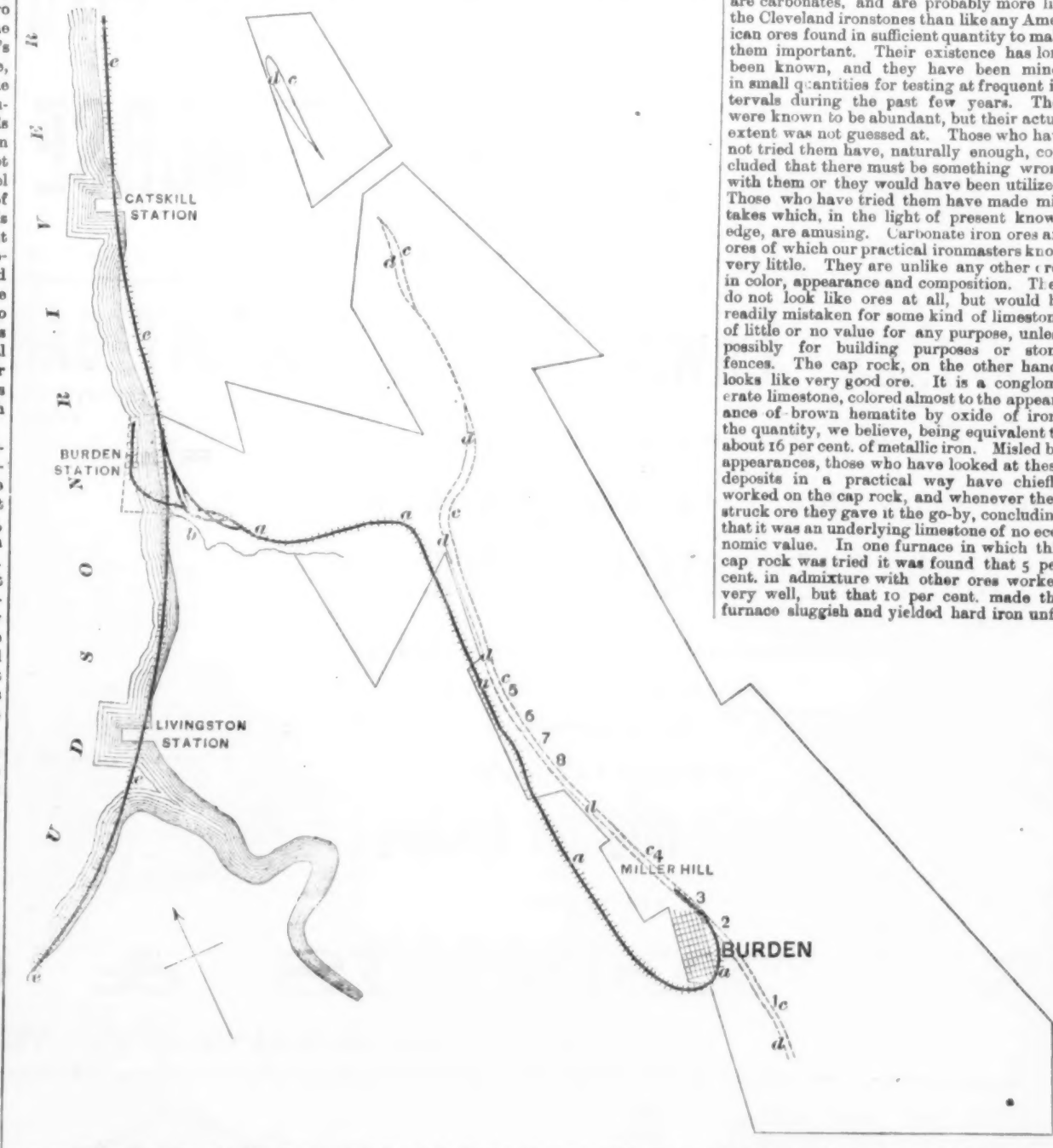
#### The Congressmen on the Labor Situation.

In an editorial last week we copied and commented upon the letters written by a number of Congressmen to the officers of the Amalgamated Association, in which these Congressmen stated that neither the reduction in the tariff nor the condition of the market necessitated a reduction in wages. It is now asserted that these letters were written by Judge Kelley, of Philadelphia; Colonel Bayne, of Allegheny, and Major McKinley, of Canton, Ohio, and they have been republished in the Pittsburgh papers, with the names of these Congressmen to give them additional weight. Assuming that this use of names is by authority, we fail to see that the gentlemen quoted can be considered competent witnesses on this point, or that their opinion respecting the state of trade and the relation of wages to selling prices is worth more than that of any one else not in the business. Such expressions of opinion from public men are injudicious, to say the least. They put the employer in a false position before the workman, they impeach the statistics of the trade, and, if incorrect, encourage the workmen to resistance when every consideration of prudence and self-interest should prompt them to meet the manufacturers in a liberal and reasonable

spirit. It is but just to say, however, that no one knows whether such letters were ever written or not, or, if written, by whom.

There is another phase of this question. In our editorial of two weeks since we quoted from a Pittsburgh paper, in which the report stated that the manufacturers insisted upon the passage of the new tariff bill. We characterized this statement as false and absurd. In answer, the Amalgamated Association states in its column in the *Labor Tribune* that

there are living Congressmen who stand ready to prove, in public if necessary, that the gentlemen mentioned in the editorial referred to in the Pittsburgh *Dispatch* did force its passage, and Mr. Jarrett and other workmen opposed it. The good old honest protectionist, Judge Kelley, had such pressure brought to bear upon him by Pittsburgh iron men that he had to succumb to their wishes, the new bill was passed, and then the iron men, through the press, accused the honest old gentleman of "weakening at the last moment." Why did McKinley, Bayne, Miller, of Mercer County, and a host of other true protectionists, vote against the bill? The iron and steel workers, notably the members of the Amalgamated Association, reverse these gentlemen for their courage and manliness in not voting for a bill (even though the manufacturers wanted it) that they saw would be likely to call for even a small reduction of the wages of their constituents—the ironworkers.



a, a, a, Hudson River Ore and Iron Company's Railroad.—b, Plant of Roasting Kilns.—c, c, c, The Dickson Vein.—d, d, d, The Cannon Vein.—Nos. 1, 2, 3, 4, Mine Openings on Dickson Vein.—Nos. 5, 6, 7, 8, Mine Openings on Cannon Vein.—e, e, e, Hudson River Railroad.

#### MAP OF THE HUDSON RIVER ORE AND IRON COMPANY'S PROPERTY.

ated Association, reverse these gentlemen for their courage and manliness in not voting for a bill (even though the manufacturers wanted it) that they saw would be likely to call for even a small reduction of the wages of their constituents—the ironworkers.

This thing might just as well be fought out first as last. We deny utterly the statements made by the Amalgamated Association. We deny *in toto* that the manufacturers—meaning the iron manufacturers—wanted the present tariff bill. We deny that the Pittsburgh iron men brought such pressure to bear upon Judge Kelley that he was forced to succumb to their wishes, and we assert that McKinley, Bayne, Miller and others voted against the bill at the request of the Pittsburgh iron men. We assert that the Western Iron Association, nearly a majority of the members of which are Pittsburgh iron men, again and again passed resolutions unanimously against the Senate bill, and demanded that the Tariff Commission bill or none be passed, and that its secretary and a committee went to Washington several times to carry out the instructions of the association. And we further state that we believe that whoever wrote the article in the Amalgamated column above referred to, stating that the Pittsburgh iron men wanted the tariff in its present shape, asserted what he knew to be false. Did Messrs. Jones, Chalfant, Lloyd, Fitzhugh, Herron, Park, Spear, Weeks, Keating, Painter, all of whom visited Washington, urge the passage of the present bill? Every one of them opposed the tariff bill in its present form as earnestly as any Amalgamated Association official, and they began earlier.

The first steel rail rolled in America was turned out at the North Chicago Rolling Mill Co.'s works, in Chicago, May 25, 1865.

#### A Visit to the Hudson River and Chateaugay Mines.

On the morning of Tuesday, May 15th, a very pleasant company of gentlemen assembled at the Grand Central Depot, in this city, for an excursion to certain properties of which comparatively little was previously known, but which are destined to exercise a very important influence in shaping the future development of the Eastern iron trade. These gentlemen came together at the invitation of the Hudson River Ore and Iron Co., James A. Burden, president, and the Chateaugay Ore and Iron Co., Hon. Andrew Williams, president. The object of the trip was to inspect the properties of these two companies, and, on the return trip, to take in such other points of interest as lay along the road. The following gentlemen constituted the party: James A. Burden, Troy; Hon. Andrew Williams, Plattsburgh; Thomas Dixon, Scranton; Col. Le Grand B. Cannon, New York; John Fritz, Bethlehem, Pa.; Samuel Thomas, Hokendauqua, Pa.; H. M. Olmstead, New York; David Dows, New York; Prof. H. B. Nason, Troy;

and Iron Co.'s property was visited, and the points selected were those which afforded the best opportunities of studying the lower vein from its outcrops. The party were carried first to the little quadrilateral at the north end of the property, where the two veins unite, and thence due south along the vein to the openings marked 5, 6, 7 and 8, which were hastily examined; thence to the embryo town of Burden, where the Dickson vein is being worked in a small way with insufficient kiln capacity for a large production. It is our intention to describe this remarkable property more fully at some future time when its development shall have progressed somewhat further. At this time we can scarcely do more than note the impressions gained during a hurried run along the lower vein, with an occasional pause to take in the general situation from some commanding knoll which overlooked the property.

The Hudson River Ore and Iron Co.'s property is without doubt one of the most valuable in the country, everything considered, and can only be compared to the wonderful Cornwall banks, near Lebanon, though not resembling them in anything except extent and ease of working. The Hudson River ores are carbonates, and are probably more like the Cleveland ironstones than like any American ores found in sufficient quantity to make them important. Their existence has long been known, and they have been mined in small quantities for testing at frequent intervals during the past few years. They were known to be abundant, but their actual extent was not guessed at. Those who have not tried them have, naturally enough, concluded that there must be something wrong with them or they would have been utilized. Those who have tried them have made mistakes which, in the light of present knowledge, are amusing. Carbonate iron ores are ores of which our practical ironmasters know very little. They are unlike any other ores in color, appearance and composition. They do not look like ores at all, but would be readily mistaken for some kind of limestone of little or no value for any purpose, unless possibly for building purposes or stone fences. The cap rock, on the other hand, looks like very good ore. It is a conglomerate limestone, colored almost to the appearance of brown hematite by oxide of iron, the quantity, we believe, being equivalent to about 16 per cent. of metallic iron. Misled by appearances, those who have looked at these deposits in a practical way have chiefly worked on the cap rock, and whenever they struck ore they gave it the go-by, concluding that it was an underlying limestone of no economic value. In one furnace in which this cap rock was tried it was found that 5 per cent. in admixture with other ores worked very well, but that 10 per cent. made the furnace sluggish and yielded hard iron unfit

to any important village to have even a prospective speculative value. The irregular tract of land shown in the diagram was acquired quietly, and not until all this preliminary work, extending over about two years, had been completed was the fact that valuable ores had been found mentioned. Mr. Burden then offered one-half of his purchase to a few friends, the company was formed, and before the first snow-fall of next winter not less than half a million dollars will have been invested in mining plant, kilns, railroads, buildings and shipping facilities. The property lies within three-quarters of a mile of the river at the northern end, and gradually recedes until at its southern end it is two miles distant therefrom. Ore mined at any point which would naturally be selected for development can be delivered, roasted, in cars or vessels at the river without handling. Gravity will move it every foot of the way from the mouth of the pit to the car or boat in which it is to be carried to the consumer, or to the tunnel heads of furnaces built along the river banks. At the company's docks there is 30 feet of water, with depth of channel for vessels of large size going south. The upper Hudson has all the depth of water needed for ore boats going north, and very favorable freight arrangements have already been made with the New York Central and Hudson River management.

We have spoken of the Hudson River carbonates as of unusual chemical composition. The following are some of the analyses of which we have secured reports:

By A. S. Bertollet, of samples taken from the Crown Point stock pile (not dated):

Alumina oxide	1.97	
Manganic oxide	3.79	
Calcio	4.59	
Magnesia	7.19	
Silice	8.76	8.97
Phosphoric	0.015	0.066
Iron	51.39	50.08
Phosphorous	0.024	0.029
Sulphur	0.657	0.738

By F. G. Lodge, chemist of the Burden Iron Co., of samples from stock pile at Troy work, May 11, 1883:

Silica	8.08
Alumina	2.60
Lime	3.39
Magnesia	6.81
Metallic iron	52.05
" manganese	1.91

By A. S. Bertollet, from samples from Crown Point stock-house:

	April 9.	12.	15.	19.
Iron	51.67	51.02	50.88	51.96
Silica	9.14	9.14	9.14	9.14
Phosphorus	0.039	0.039	0.039	0.039
Sulphur	0.719	0.719	0.719	0.719

By the same chemist, March 16, 1883:

Iron	51.16
Phosphorus	0.039
Sulphur	0.35

By the same chemist, March 15:

Iron	50.85
Sulphur	0.65
Phosphorus	0.039

These analyses are all of roasted ore. They show that the Hudson River carbonates are unique in being of quality admirably suited for Bessemer iron. Even the small percentage of sulphur shown, though disposed of in the blast furnace, will be expelled from the ore when roasted more slowly in higher kilns. Those at present in use are roasted in 15-foot kilns, which are unsatisfactory in many respects. The company are now building three kilns, each 20 feet inside diameter and 60 feet high. Each will have 200 tons capacity per day. The principal object of the roasting is to expel the carbonic acid. With these three large kilns the company will be able to ship 600 tons of ore per day, and the number of kilns will be increased to 10 as soon as machinery for raising and handling 2000 tons per day can be put in operation.

It is the intention of the company to mine these ores in large quantities, and to sell them at prices which will give consumers in the East an advantage fairly offsetting the cheaper fuels of the West. A vast tonnage with small profit per ton is the settled policy of the company. It will probably be some time before the immense importance of these deposits is appreciated by the iron trade at large, but perhaps an interest will be excited when we say that, in the opinion of all of those who have seen them whose opinions on such points are of value, they are destined to make the Hudson River Valley the center of an immense production of cheap iron. Probably one-third of all the iron made in Great Britain at the present time is made from carbonate ores. Neither of the two great European sources of supply—the Cleveland and the Luxembourg deposits—are comparable in quality with those at our own doors. The Hudson River ores average above 50 per cent. in metallic iron, and are practically free from phosphorus. They are self-fluxing, work easily and freely alone in the blast furnace, and are most desirable for mixture with magnetic or other ores. They can be mined very cheaply, and could not have been better located had nature consulted the convenience of consumers. Both veins run with surprising uniformity for a distance of fully five miles. They are each about 18 feet thick, giving an average of 36 feet of ore throughout their entire length. The cap rock is firm and dense and no timbering is required; the underlying shales give a solid floor. The Cleveland deposit consists of one vein, 18 miles long and about 12 feet thick. From this, 6,000,000 of tons of ore were taken out last year. There is no reason why as much ore could not be taken in a year from the 36 feet of the Hudson River property should the market demand it. In a word, the available supply is equal to the greatest possible requirements of consumption for a period very much longer than present estimates need take into consideration. The Hudson River carbonates solve the problem of cheap ores for Eastern consumers at least, and we have yet to discover that in any respect their importance second to that of any deposit yet found in this country, everything considered.

All this will, no doubt, be regarded as very interesting, and the trade will hear of these ores with surprise and pleasure, but during the last 10 years any one might have had them, in whole or in part, for the cost of the farms which hold them. "If we had only known!" will be the moral exclamation. But who is to blame for this lack of knowledge? In the *Iron Age* of November 9, 1874, the leading editorial, about three columns in length, discussed these ores in great detail, and gave information as to their extent and value, which, in addition to

Austin G. Gorham, New York; James Morrison, Troy; George Henry Warren, New York; Wm. E. C. Cox, Reading; A. Van Santvoort, New York; George A. Hoyt, Stamford, Conn.; C. F. Young, Honesdale, Pa.; J. Avery Richards, Boston, Mass.; Howard H. Burden, Troy; W. M. Habirshaw, New York; C. B. Houston, Chester, Pa.; N. W. Horton, New York; Jos. J. Albright, Scranton, Pa.; E. C. Lord, Morristown, N. J.; James C. Bayles, New York; Charles F. Mattes, Scranton; Judge James Matthews, New York; Robert Olyphant, New York; W. H. Wallace, New York; George S. Dixon, Scranton; Hon. Smith M. Weed, Plattsburgh; R. Forsythe, Chicago; Hon. S. P. Brown, Plattsburgh; Prof. D. M. Green, Troy; Theodore Voorhis, Albany; F. S. Hodge, Troy; A. S. Norton, New York; V. M. Olyphant, New York; A. Tower, Fort Henry; A. H. Masten, New York; D. M. Kendrick, Albany, and perhaps a few others whose names cannot now be recalled. Some of the gentlemen included in the above list joined the party *en route*, but the number of those starting from New York was great enough to comfortably fill the two sleeping-cars which had been provided for the accommodation of the company.

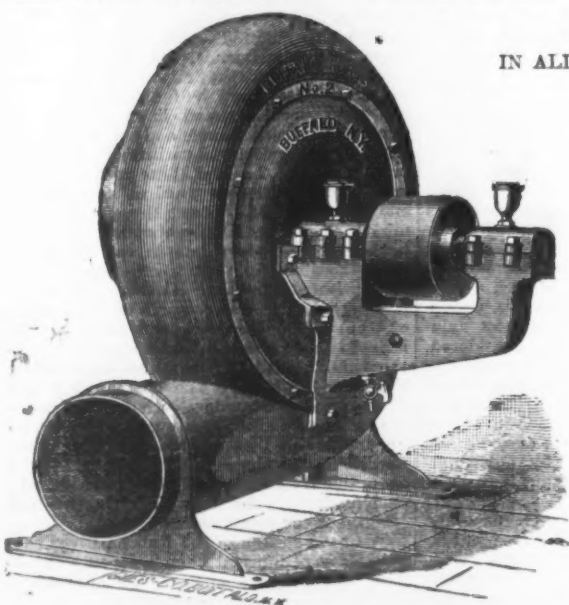
At the hour named in the invitation (10.45 a. m.) the two sleeping-cars moved out of the Grand Central Depot, attached to the Hudson River R. R. train leaving at that time. The run to Burden Station was uneventful, and was just about long enough to afford the members of the party a chance to become acquainted. A delightful little lunch was served in the cars, and thus fortified the party were quite ready to leave the cars and stretch their legs by a climb over the picturesque hills of the west shore of the Hudson. Carriages were in waiting on the dock, however, and the party were carried very comfortably up the wagon road which the company have opened along the line marked a a in the accompanying diagram, and beside which is staked out a railroad not yet built. Only a small part of the Hudson River Ore

for foundry purposes. As the result of this and similar empirical tests, the Hudson River carbonates have never been counted of much value. In fact, they were never classed as carbonates at all, but were considered rather lean spathic ores, unlikely to invite development so long as better ores were accessible.

The recognition of their true character and the organization of a scheme of development calculated to give them the greatest possible value for all classes of consumers is due to Mr. James A. Burden. There was no lucky chance or accidental discovery in the matter. Returning some years ago from a foreign trip, during which he had carefully examined the Cleveland ironstones, Mr. Burden decided that if there were any carbonates in the Hudson River valley, or near enough to Troy to be of value to him, he would find them. Experienced geologists were retained and set to work to search wherever the geological formation indicated the probability of iron ores being found. Both sides of the river were carefully examined and the search extended from New York Bay to Lake Champlain. These experts had always at command the resources of well-appointed laboratories for chemical analysis, and reported everything they found, whether of great or small importance. In due course they reached the carbonates in the Hudson River shales, and for the first time they were examined by strictly scientific methods. Their true character was defined, and samples of the ore were forwarded for analysis. The results were so surprising that they were regarded as improbable, and further examinations were ordered. Repeated proofs being secured, and the outcrops of the veins traced for several miles, it next became a matter of interest to determine their extent. The points at which the deposits showed, or came near to the surface to be accessible, were fixed, and it was found that the total area could be acquired without serious difficulty, as it comprised only farm lands not near enough



## NEW AND IMPROVED Buffalo Exhausters,



IN ALL THEIR VARIETY,

For Planing  
Mills,  
Ventilating  
Purposes, &c.

Superior to any  
other make.

**BUFFALO FORGE COMPANY,**  
BUFFALO N. Y.

## The Common Sense Sash Holder and Lock Combined.

Patented March 6th, 1883.



Is the best, cheapest  
and most complete  
Sash Holder and  
Lock in the market,  
and we think has  
the largest sale. It  
holds the window at  
any point, and locks  
the same when  
down, and entirely  
prevents windows  
from rattling.

I am the sole own-  
er of this patent, and  
sole manufacturer  
of these fasteners,  
and all persons are  
hereby notified of  
this fact. Any per-  
son infringing will  
be dealt with ac-  
cording to law. Par-  
ties who have been  
buying and selling  
the "Practical Fast-  
ener," so-called, will  
do well to heed the  
warning. Orders  
from the trade re-  
spectfully solicited.  
Circular with price  
list mailed on appli-  
cation.

**H. A. WILLES,**  
MANUFACTURER AND DEALER IN HARD-  
WARE SPECIALTIES,  
727 Market Street, PHILADELPHIA, PA.

**CLAY PIGEONS  
AND TRAPS.**

WHOLESALE ONLY. AGENTS WANTED.

ADDRESS:  
**THE CLAY PIGEON COMPANY,**  
166 Main Street, CINCINNATI, OHIO.

## LIVINGSTON HORSE NAIL CO.

104 Reade St., NEW YORK,

AGENTS FOR

GLOBE, EUREKA, BAY STATE,  
PUTNAM, ESSEX, EMPIRE,  
VULCAN, CHAMPION, WESTERN  
**HORSE NAILS.**

NEW LISTS AND DISCOUNTS FURNISHED ON APPLICATION.

## The Knickerbocker Lawn Mower.

Patented June 18th, 1882, and April 3d, 1883.

The Only Mower in Market with a  
**SOLID SHEAR-STEEL CUTTER.**

Incomparably the Lightest Running  
and Best Made Machine  
in Existence.

MANUFACTURED ONLY BY

**CARR & HOBSON, Limited,**

AND SOLD BY

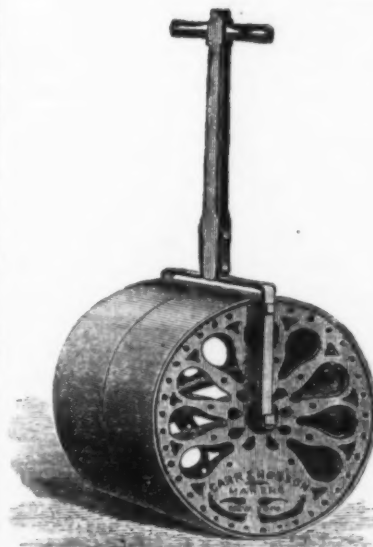


10 Inch, . . . . . \$13.00  
12 Inch, . . . . . 15.00  
14 Inch, . . . . . 17.00

**PAGE, DENNIS & CO.,**  
325 Broadway, New York.

## PATENT GARDEN ROLLER.

PATENTED MARCH 18th, 1879.



We are now making our new Patent Garden  
Roller, as shown by the cut herewith, in six  
different sizes, varying in weight from one  
which a lad can push to a size which is almost  
heavy enough for a pony. Each size is made  
of two sections, revolving independently upon  
a wrought-iron axle, either half thus acting  
as a pivot upon which to turn around when  
necessary. These rollers never mar the turf  
as do those made of a single section, and they  
are also less expensive than any other well-  
finished appliance of the kind.

Our patented device for holding the handle  
in an upright position when not in use will be  
appreciated by all who are familiar with the  
old-fashioned drop-handle rollers, and our  
ornamental end-plates are an attraction not to  
be found in any other implement of this class  
in market.

No. 1, weight, 150 lbs.,	\$12.
" 2, " 200 "	16.
" 3, " 250 "	20.
" 4, " 300 "	24.
" 5, " 400 "	32.
" 6, " 500 "	40.

## BLOCKS

WOOD &amp; WROUGHT IRON SHELLS.

**PENFIELD BLOCK CO., Lockport, N. Y.**

HENRY B. NEWHALL CO., 105 Chambers St., New York & 47 Pearl St., Boston,

(J. H. Work, Manager.) Eastern Agents.

S. H. & E. Y. MOORE, 163 & 165 Lake Street, Chicago Agents.



## Keystone Portable Forges.

Best in the Market. Strong Blast and Easily Worked.  
Durable, and give entire satisfaction. All sizes for  
every kind of work. Also

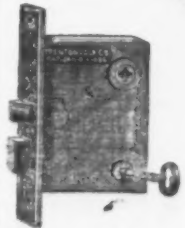
Pressure Blowers  
AND  
Exhausters.

Send for Catalogue.

MANNING, MAXWELL & MOORE  
New York Agents, 111 Liberty St.

**Keystone Portable  
Forge Co.,**

204 North Fourth Street,  
PHILADELPHIA, PA.



**TRENTON LOCK & HARDWARE CO.**  
WORKS  
AND  
PRINCIPAL OFFICE:  
**TRENTON, N. J.**  
AGENCIES AND DEPOTS:  
**JAMES M. VANCE & CO.**  
211 Market St., Philadelphia.  
**JAMES MARSHALL,**  
48 Warren St., N. Y.



WITH PATENT ADJUSTABLE ATTACHMENT. The only Saw that can be adjusted for either a One-Man or a Two-Man Saw.  
We make the following lengths, 3 1/2, 4, 4 1/2, 5 feet. Send for sample.

**WHEELER, MADDEN & CLEMSON MFG. CO., Middletown, N. Y.**



# GALLOWAY BOILER

IMPROVED UNDER PATENTS OF 1875 AND 1876.

Safety, Economy in Fuel, Low Cost of Maintenance, Dry Steam without Superheating, Large Reserve Power ARE THE ADVANTAGES OFFERED BY THIS BOILER IN A PRE-EMINENT DEGREE.

3000 Horse-Power in Progress and for Immediate Delivery. Correspondence Solicited.

EDGE MOOR IRON COMPANY,

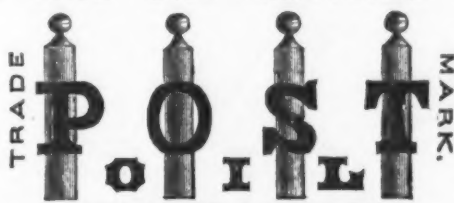
SOLE LICENSEE AND MANUFACTURER FOR THE UNITED STATES,

POST OFFICE, WILMINGTON, DELAWARE.

Philadelphia Office, 1600 HAMILTON STREET. - New York Office, 79 LIBERTY STREET.

WM. SELLERS, Pres. JNO. SELLERS, JR., Vice-Pres. ELI GARRETT, Sec. and Treas. GEO. H. SELLERS, Gen. Supt.

## Post's Waterproof Belt Oil and THE HP NAIL CO., Leather Preservative, FOR WET AND DRY LEATHER BELTING.



Registered in the U. S. and Great Britain.

Leather dressed with this oil will not crack or rot, as heat, cold, water or gas has no effect on it. It will spread one-third further and last much longer than any oil for the same purpose. It never turns rancid: will keep in any climate. Belts may be run in water at one end, and a hot room at the other, and still be soft, dry and pliable. Warranted not to start glue laps or gum on belts or pulleys, and to keep the surface perfectly smooth. Beware of imitations sold at a cheaper price, the color of which is well calculated to deceive.

ESTABLISHED AGENCIES IN THE UNITED STATES:

J. B. Hoyt & Co., New York.  
J. & H. Phillips, Pittsburgh, Pa.  
J. B. Farnum, Woonsocket, R. I.  
G. D. Barr, Buffalo, N. Y.  
E. B. Preston & Co., Minneapolis, Minn.  
Post & Co., Cincinnati, O.  
I. B. Williams & Sons, Dover, N. H.  
J. B. Hoyt & Co., Chicago, Ill.  
Langlois & Son, Racine, Wis.  
Laurence & Herkner, New York.  
J. Le Roy Place, Troy, N. Y.  
Brown Bros. & Co., Providence, R. I.  
Jas. H. Billington & Co., Phila., Pa.  
Davenport, Johnson & Co., Atlanta, Ga.  
Sanford & Co., Fall River, Mass.  
J. Ashton & Son, Trenton, N. J.  
Geo. A. Smith, Richmond, Va.  
W. H. Dillingham & Co., Louisville, Ky.  
E. M. Preston & Co., Chicago, Ill.  
C. E. James, Chattanooga, Tenn.  
Cameron & Barkley, Charleston, S. C.  
Towner, Landstreet & Co., Baltimore, Md.  
C. B. Choate, East Saginaw, Mich.  
E. G. Studley & Co., Grand Rapids, Mich.  
Mantle & Cowan, Louisville, Ky.  
E. F. Bradford & Co., Cincinnati, Ohio.  
Edwin M. Cross, Syracuse, N. Y.  
H. D. Edwards & Co., Detroit, Mich.  
Thayer, Dunham & Ross, Boston, Mass.  
Novelty Mfg. Co., Depere, Wis.  
Morley Bros., East Saginaw, Mich.

SCOTLAND: Robert Balderston, Glasgow. ENGLAND: J. Hunter Watts, London.

We solicit Correspondence from Dealers in Manufacturers' Supplies.

E. L. POST & CO., No. 10 Peck Slip, N. Y.,  
SOLE MANUFACTURERS.

A. FIELD & SONS,  
MANUFACTURERS OF

## WIRE NAILS

Of Every Quality and Description.

Taunton, Mass., and 78 Chambers Street, New York.

## CROWN WATER METER.

ADOPTED BY THE

DEPARTMENT OF PUBLIC WORKS,

NEW YORK CITY.

## National Meter Co.,

JOHN C. KELLEY, President,

No. 51 Chambers St., NEW YORK.

## The Medart Patent Wrought Rim Pulley



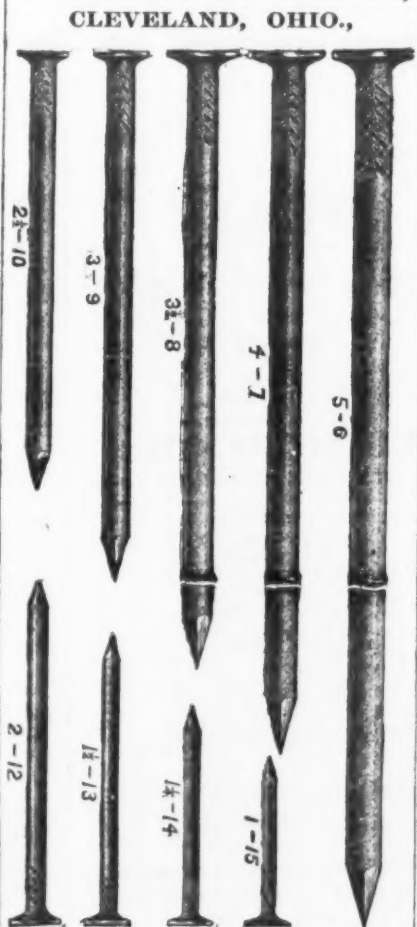
THE LIGHTEST, STRONGEST, BEST BALANCED AND CHEAPEST IN THE WORLD.

We make Whole Pulleys from 9 inches to 66 inches diameter, and Split Pulleys from 12 inches to 66 inches diameter. All widths of face up to 32 inches crowning and up to 36 inches straight; also tight and loose and Double Arms.

Absolute Satisfaction Guaranteed.

SEND FOR PRICE LIST.

MEDART PAT. PULLEY CO., 105, 107 S. 7th St., St. Louis, Mo.



MANUFACTURERS OF

## WIRE NAILS

OF ALL KINDS.

Barbed or Plain Steel, Iron and Brass Nails, Cast Steel Wire Brads, Cast Steel Wire Finishing Nails, Cigar Box Nails, Escutcheon Pins, Wagon Nails, Clinch Nails, Hinge Nails, Wire Spikes for Track, Bridge and Dock Work, Tinned Nails, Galvanized Nails.

## T. NEW'S PREPARED ROOFING

For steep or flat roofs. Applied by ordinary workmen at one-third the cost of tin. Circulars and samples free.

T. NEW, 39 John St., New York.  
BARRETT, ARNOLD & KIMBALL, Western Agents, Chicago, Ill.

NELLIS, McINTIRE & CO.  
PITTSBURGH, PA.  
Manufacturers of Electric Spring Agitators, For Cultivators, Harrows, Seeders and Smoothing Harrows.  
Nellis' Original Harrow Horse Ray Fork, Nellis' Original and Wood Wheel Pulleys, Nellis' Cast Steel Castings, Nellis' Cast Steel Castings, Castings and Castings, Agricultural Steels of all kinds, Grindable Cast, Iron Casters, and Open Heart Steels. For Agents and Diggers, &c.

ICE CREAM FREEZERS,  
TORREY'S PATENT,  
S. ROEBUCK & CO.,  
Manufacturers,  
164 FULTON ST.,  
NEW YORK.

VARIETY METAL BOOM.  
Iron Foundry and Machine Shop.  
STEAM HEATING BY DIRECT RADIATION in all its Branches a Specialty. Brass and other Metal Moulding, Casting and Finishing. Noisless Vertical Engines, Hydrants, Fire Plugs, &c.

FRAS. B. HANNAN,  
Pottsville, Schuylkill Co., Pa.

HEATHFIELD, EYRE & CO.  
158 Leadenhall Street, LONDON, ENGLAND.  
IRON, TIN PLATE AND METAL MERCHANTS.

Scrap Iron, Old Rails, Pig Iron, &c., quoted at lowest prices. Cable Address "Gentian," London.

being surprisingly accurate, included pretty much all that is now known about them. The article in question was written at a time when furnaces on or near the Hudson River were largely dependent upon the Dutchess County hematites, costing from \$7 to \$7.50 per ton at the furnaces. We quote from the article as follows:

The more recently discovered beds of ore here referred to, are situated in Columbia County, N. Y., within a distance not exceeding a mile from the Hudson River, and are found in the range of hills parallel with the line of that stream. The extreme southern limit of the deposit is at a point about opposite Livingston station, on the Hudson River Railroad, and running thence northwesterly, the same relative distance from the river, to near Catskill station, on the same railroad. The whole territory here included originally formed part of the old Livingston Manor, and a portion of it is still within the limits of that property, the Livingston Mansion, "Oak Hill," with its magnificent view of the Hudson and the Catskill Mountains opposite, being but a short distance from the various points at which the ore has been mined. These deposits were known to exist by the local owners of the soil for some years, but were never worked, nor, indeed, at all practically examined, until during the fall of 1873, and since that date. When worked in furnaces on the Hudson and in Pennsylvania, they have made a strong, tough iron, quite free from elements injurious to its quality.

The importance of such a deposit of ores in proximity to the great line of water transportation of New York State, and at a point where a sufficient depth of water for vessels of any draft is had, cannot be overestimated. The height of the hill or ridge, in the summit of which the principal outcrop was found, is, by barometrical measurement, 200 feet above the level of the Hudson River, and continues at or near this height for the whole distance, some three miles, to the northern extremity. Throughout the entire length of these beds the configuration of the country is such as to admit of the construction of easy ways, plank roads or narrow-gauge railroads to the river at moderate cost, while the country roads, already opened, furnish easy access to shipping points on either the Hudson River or the river being done. The entire distance to the railroad and river being done, will, of course, greatly facilitate the transportation of the ore by whatever style of road may be hereafter decided upon, when, as will undoubtedly be the case, the favorable location and excellent quality of these ores are known and appreciated by the trade.

The value of such a deposit of ore within 120 miles of New York City, and but a little over a mile from the navigation of the Hudson River, may well attract the attention of the ironmaster, since it offers the certainty of a practically unlimited supply of material attainable under the most favorable conditions of expense. When, however, the entire extent of this range of ore hills are computed at the same ratio, the amount of ore here at the command of the furnaces of New York, Massachusetts and Connecticut, as well as those of New Jersey and Eastern Pennsylvania, is of sufficient magnitude to encourage the manufacturer, even under the greatest possible depression in prices. The estimated cost of mining and transporting this ore is not, at outside figures and under present conditions, over \$2 per ton, which includes mining, hauling, and railway charges, dockage and tipping or loading into boats, or, in other words, costing \$2 per gross ton, f.o.b., on vessels of any size. If mined on a large scale, and with appliances for handling at mine and shipping point, this could be reduced considerably, but in all our calculations the effort is made to cover all charges likely to occur in practice, and represent actual expense to furnace owner purchasing at dock. Allowing, therefore, for royalty, interest and a fair, though not exorbitant, profit to the company mining, this ore can be sold f.o.b. at dock for \$3.50 per ton.

It is now on water navigation, and available under the cheap freights incident to that method of transportation, in range at an almost nominal figure for the furnaces at Albany, Hudson, Poughkeepsie, Cold Spring, Manhattanville, &c., and in no case exceed 50 cents per ton, and generally under 30 cents. For the furnaces of New Jersey and Eastern Pennsylvania, including Philadelphia and vicinity, and the Lehigh Valley, they will go via river and canal without transshipment, at a freight cost, delivered, of \$1.50 per gross ton, and to any point on the Schuylkill Canal for \$1.75 to \$2.00. In most cases these prices will deliver the ores cheaper than any hematites of equal purity and richness can be locally had, or, respectively, at a cost of \$3.75, \$4, \$5 and \$5.75 per ton, which, for ores ranging over 45 per cent. metallic iron, and fit for Bessemer pig, is lower than any like grade ores can be obtained at present in the portion of the United States alluded to. Of the quality of the ores here referred to there is abundant evidence, as shown by the following analyses, which, it is to be remembered, are exclusively of those from surface outcrops, and before mining had opened the deposits at such depth as to insure its improvement. At the same time it is to be noted that the ore is rapidly improving in richness as mined.

An analysis of outcrop gave:

Peroxide of iron..... 66.37  
Silica..... 21.71  
Alumina..... 2.10  
Lime..... .43  
Water and loss..... 9.31  
Total..... 100.00

Subsequent analyses, made in December, 1873, by Dr. Wendell, chemist to the Bessemer Steel Works, Troy, gave as follows:

No. 1.  
Metallic iron..... 57.44  
Sulphur..... 0.039  
Phosphorus..... 0.055

No. 2.  
Metallic iron..... 48.22  
Sulphur..... 0.031  
Phosphorus..... 0.043

The latter contains also alumina and manganese, and both are justly regarded as good Bessemer ores. Analysis subsequently made gave the following results, both before and after roasting.  
Analysis of iron ores from Columbia County, N. Y., No. 1, red material; No. 2, gray material; No. 3 represents No. 2 after roasting:

No. 1. No. 2. No. 3.  
Oxide of iron..... 62.98 43.00 61.50  
Siliceous matter..... 21.05 22.25 31.15  
Alumina and manganese..... 3.31 3.40 4.70  
Lime and magnesia..... 1.20 1.75 2.45  
Phosphoric acid..... trace trace none  
Sulphuric acid..... trace trace none  
Carbonic acid..... 11.25 27.82 none

Total..... 99.50 99.21 99.99

Metallic iron..... 44.00 34.15 47.17

No. 1, roasted, yields oxide of iron..... 74.31

No. 1, metallic iron..... 49.91

From the above analyses of average samples of "run of mine," it is evident that these ores will compare very favorably with any of their class mined in the United States, and undoubtedly offer suitable material for Bessemer pig metal. Where they have been worked in the furnace, the testimony is in every case conclusive as to their merits. In July last the spathic ore, No. 2, was worked at the Jagger Iron Co.'s furnaces at Albany, with the testimony from the superintendent in charge at the time, that "the ore works freely, produces a good fluid clinker and gives a good yield of iron."

It was used in place of the American hematite, which is known to be of a superior quality and rich in iron, and our furnace yield was increased and our production was greatly improved in strength and quality. This would seem to offer sufficient testimony as to quality.

Of course, these ores offer similar advantages for admixture with any other magnetite abundant or desirable, and come under the cost of hematites native to most furnaces on the Atlantic slope. Their proximity to water, with the possibility of river or canal navigation, or both, to most centers of consumption, and by railroad after the close of navigation, together with their great abundance, make them a peculiarly valuable to furnace owners, and of consequent importance to the trade at large. Why such an extensive deposit has been neglected up to this period is one of the vagaries which seem to have constantly attended the exploration of our mineral wealth.

To this we may add that the subsequent abandonment of these ores, owing to a failure to discriminate between the vein and the

cap rock, is a curious commentary on the rule-of-thumb methods which our ironmasters have followed for so many years. *Ex post facto* wisdom is always wise above what is written.

Returning in carriages to the cars, the party were run up to Albany with all the dignity of "travelers by telegraph," and their cars were switched around on the track of the Delaware and Hudson Canal Co., where their special train for the remainder of the trip was made up. What this consisted of we really do not know, but it seemed to afford all the conveniences of home, with none of the domestic encumbrances. Immediately on arriving in Albany dinner was announced, and we doubt if such a dinner was ever before served on a railroad train. From one of the new passenger coaches of the Delaware and Hudson Canal Co. all the seats had been removed, and along the entire length was set a table secured to the floor, with chairs on either side. The table was beautifully dressed with flowers and decorations, and beside each plate lay a menu of a dinner of five courses served by an accomplished caterer. Soup, fish, meats, game, vegetables, pastry and confections, fruits and coffee, with appropriate wines of excellent quality, astonished and delighted the hungry travelers. The subsequent effort at toasts and speeches was not quite so successful, as the company had not fully warmed up to the fun of the trip, and were somewhat too fresh from counting room and office to forget the cares and anxieties of business life. The fun came later, and steadily improved in quantity and quality until the little company of fourteen— which, decimated by desertions along the way, reached New York on Friday evening— were full to their top vest buttons— with fun.

At 11 o'clock Tuesday night the cars appropriated for the party moved out of the Albany depot, and at 7 o'clock the next morning Plattsburgh was reached. Breakfast was served in the dining-car, and at a convenient hour the party changed to the cars of a special train on the Plattsburgh and Dannemora Railroad and were carried to Lyon Mountain, where the principal mines of the Chateaugay Ore and Iron Co. were found. On the way up the party stopped a few minutes to visit the little charcoal furnace of the company, near Plattsburgh. This is a small stack producing about 15 tons of pig iron per day. The blast is furnished by a Root blower, and since this was put in the furnace has worked without hitch or accident of any kind. As only Chateaugay ore is used, this smooth working speaks well for its uniformity and ease of reduction. It is the expectation of the manager that he will be able to increase the product to 19 tons per day.

As early as 1873, and perhaps even earlier, the Chateaugay property had been to a very moderate extent developed by Messrs. Smith, M. Weed and Andrew Williams, of Plattsburgh, who are to be credited with the honor of opening this wilderness and planting there an industry of very great importance. It was a large undertaking, attended with many discouragements and difficulties, but the final success of the enterprise has been great enough to amply repay the work of years. The tract owned by the company comprises about 80,000 acres. The greater part of this tract was bought for the timber. The company have 112 beehive kilns of large capacity. In their several locations they own 31 fires, and 29 more under other ownership work their ores and fuel and turn over their product to the corporation. The forges consume 27,600 bushels of charcoal per day, and the blast furnace needs 1500 more, calling for about 195,000 cords of wood per year. Some 2000 acres must be cleared annually, but before the whole tract has been cut over time will have been afforded for a new growth to replace that destroyed.

The company have two veins of magnetic ore of high grade, though not as rich in iron as some other magnetites with which the trade is familiar. They have been traced for 13½ miles. One vein has been proven by openings along a distance of 8 miles, and the other has been developed by a continuous opening 1½ miles long. The average width of the front vein is about 20 feet. The back vein at some points shows a width of from 40 to 50 feet. The ore is surprisingly uniform, and a fair average sample will show the following composition, per analyses made by Mr. A. S. Bertollet, of Crown Point:

Peroxide of iron..... 45.97  
Protoxide of iron..... 21.45  
Protoxide of manganese..... 6.139  
Alumina..... 2.101  
Lime..... 4.987  
Magnesia..... 3.261  
Phosphoric acid..... 0.039  
Sulphur..... 0.001  
Silica..... 21.134  
Iron..... 49.147  
Phosphorus..... 0.042

The back vein is somewhat more silicious than the front vein. Of the product of the former, about 50 per cent. is shipping ore; of the latter, from 60 to 65 per cent. is so graded. But the entire product of the veins is utilized. The lean ores are all crushed and concentrated, and are thus brought up to an average of 65 per cent. metallic iron. The present daily output of ores is, we believe, 800 tons, but the company have facilities for raising and handling 2000 tons should the market call for it. Mining is carried on with the aid of compressed air, and part of the plant consists of three Rand-Duplex compressors, capable of running 60 drills, and a Clayton compressor, capable of running 20 drills. An iron main of 8 inches diameter runs along the vein some three-quarters of a mile, with service pipes carried into each of the 22 openings. The hoisting apparatus already in place includes 22 drums, distributed at different points along the vein. This machinery is all of the most approved construction and pattern, and it is set up on foundations built to last. The ore is brought from the shafts in iron cars and dumped under cover for sorting. The best ore is shipped, while that which carries an undue proportion of gangue is passed to the separators, of which there are four in constant operation. In three of these separators the ore, after roasting to render it friable, is crushed under stamps and washed. In the large separator, which was the only one visited by the excursionists, the ore is crushed without roasting. It is mechanically



# RHODE ISLAND TOOL CO.,

SUCCESSORS TO  
**PROVIDENCE TOOL CO.,**

MANUFACTURERS OF

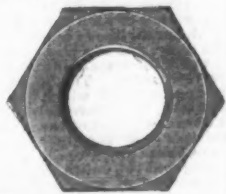
Machinery Nuts (Square and Hexagon),  
CHAMFERED AND TRIMMED WITH DRILLED HOLES.

ALSO OF:

Finished Case-Hardened Hexagon Nuts and  
Squared and Tapped Hexagon Nuts.  
U. S. GOVERNMENT STANDARD THREADS.



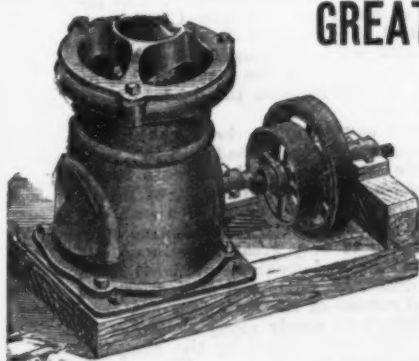
WARRANTED  
INTERCHANGEABLE.



OTHER ARTICLES OF THEIR MANUFACTURE ARE  
Turn Buckles, Clinch Rings, Bolt Ends, Nor-  
cross Patent Iron Blocks and Chain Links,  
Small Drop Forgings made to Order.  
**PROVIDENCE, R. I.**

## AGENCIES:

Henry B. Newhall Co., - - No. 105 Chambers Street, New York,  
and No. 47 Pearl Street, Boston, Mass. (J. H. Work, Manager).  
S. H. & E. Y. Moore, Nos. 163 and 165 Lake Street, Chicago, Ill.



## GREATEST ROCK BREAKER ON EARTH.

CAPACITY { A TON A MINUTE.  
DON'T FORGET IT.  
Guaranteed to do Double the Work of  
any other or Money Refunded.

SEND FOR CIRCULARS.

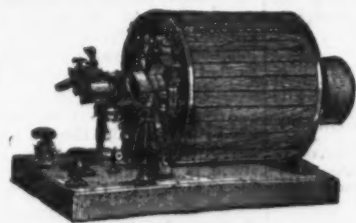
Engines, Boilers, Stamp Mills and  
Mining Machinery.

**GATES IRON WORKS,**  
52 Canal St., Chicago.

## THE AMERICAN DYNAMO-ELECTRIC MACHINE, For Electro-Plating, Electrotyping, &c.

Requires no Water.

Combining  
all the



Latest  
Improvements,  
Cannot Reverse  
Current.

## The Zucker & Levett Chemical Co., GENERAL AGENTS,

Manufacturers and Importers of NICKEL PLATERS' SUPPLIES.

540, 542, 544 & 546 WEST 16TH STREET, N. Y.

## N. B. TO THE TRADE.

(Registered Trade Mark, Oct. 8, '78, No. 6,704, and May 31, '81, No. 8,101.)



PATENTED:

Aug. 27, 1872, No. 130,853.

Dec. 2, 1873, No. 145,105.

Aug. 25, 1874, No. 154,460.

Nov. 10, 1874, No. 156,669.

May 7, 1878, No. 203,278.

## H. W. HILL & CO.,

H. W. HILL,  
C. P. HOUSE.

DECATUR, ILL.

## THE U. S. IRON & TIN PLATE COMPANY Limited,

Demmler P. O., Allegheny Co., Pa.,

MANUFACTURERS OF THE

U. S. A. M. and J. H. brands of Cold Rolled and Polished  
SHEET IRON AND SHEET STEEL.

## John T. Lewis & Bros.

No. 231 South Front St.,  
PHILADELPHIA.



TRADE MARK.

MANUFACTURERS OF

Pure White Lead, Red Lead, Litharge,  
Orange Mineral, Linseed Oil,  
AND PAINTERS' COLORS.

## JOHN JEWETT & SONS

Manufacturers of the well-known brand

WHITE LEAD



TRADE MARK

ALSO MANUFACTURERS OF

LINSEED OIL.

181 Front Street, NEW YORK.



## The Atlantic White Lead and Linseed Oil Co.,

Manufacturers of  
White Lead (Atlantic), Red Lead, Lith-  
arge, Glass Makers' Litharge and  
Orange Mineral;  
LINSEED OIL,  
Raw, Refined and Boiled.

**ROBERT COLGATE & CO.,**  
287 Pearl St., NEW YORK.

## SALEM LEAD COMPANY, CORRODERS AND MANUFACTURERS OF PURE WHITE LEAD.



ALSO MANUFACTURERS OF

Lead Pipe and Narrow Sheet Lead.  
F. A. BROWN, Treas. SALEM, MASS.

## WITHEROW & GORDON, Engineers & Contractors

PITTSBURGH, PA.

Agents for the

**WHITWELL  
HOT BLAST STOVES.**  
OVER 600 IN USE.

The following parties either have them in use or  
under construction  
Cedar Point Iron Co., N. Y.  
Dunbar Furnace Co., Pa.  
Crane Iron Co., Pa.  
Pennsylvania Steel Co., Pa.  
Neshannock Iron Co., Pa.  
R. H. Coleman, Lebanon, Pa.  
Chester Rolling Mill Co., Pa.  
Davenport, Fairbairn & Co., Pa.  
Isabella Furnace Co., Pa.  
Spearman Iron Co., Pa.  
Etna Iron Works, Ohio.  
Milton Coal and Iron Co., Ohio.  
Hocking Valley Iron Co., Ohio.  
Winona Furnace Co., Ohio.  
Moss & Marshall, Ohio.  
H. Campbell & Sons, Ohio.  
Hocking Valley Iron Co., Ohio.  
Cleveland Rolling Mill Co., Ohio.  
Meier Iron Co., Ill.  
North Chicago Steel Co., Ill.  
Union Iron and Steel Co., Ill.  
Means & Culbertson, Ky.  
Ashland Furnace Co., Ky.  
Northern Iron Co., Ky.  
Southern States C. L. and S. Co., Tenn.  
Sewanee Furnace Co., Tenn.  
James G. Warner, Rising Fawn, Ga.  
Ohio Iron Co., Zanesville, O.  
Sloss Furnace Co., Ala.

## CROTON MAGNETIC IRON MINES.

THE ALL MINES. McCOLLUM MINES.

**BREWSTERS, Putnam Co., N. Y.**

AVERAGE ANALYSIS.

Per-oxide Iron .....	50.59	Silica .....	15.70
Protoxide Iron .....	23.02	Carbonic Acid .....	—
Protoxide Manganese .....	.32	Phosphoric Acid .....	.37
Alumina .....	3.27	Titanic Acid .....	—
Magnesia .....	.76	Sulphur .....	.58
Lime .....	1.65	Soda .....	—
		Water, &c. ....	—
Metallic Iron .....	53.31 %		
Metallic Manganese .....	.24		
Phosphorus .....	.16		

THE CROTON MAGNETIC IRON MINES are now ready to contract for next year's  
delivery of their superior Magnetic Iron Ores, delivered at Port Morris, New York City or on  
the line of New York and New England Railroad, Erie Railroad and connections.

The ores are guaranteed to yield 50 % Metallic Iron.

W. E. RIDER, Genl. Manager.

Brewsters, Putnam Co., N. Y.

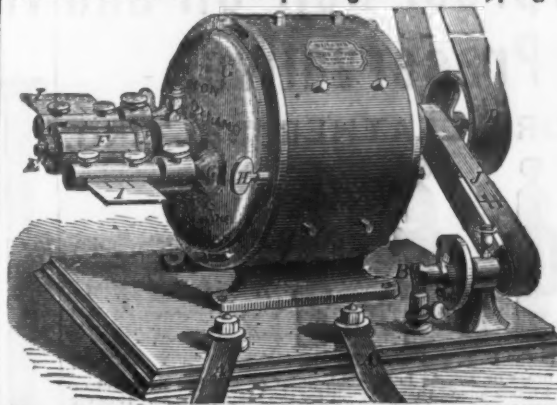
OFFICE,  
29 PARK ROW, N. Y. City.

P. O. Box 2180.

JOHN H. CHEEVER Pres.

J. D. CHEEVER, Treas.

## HANSON, VAN WINKLE & CO., Sole Agents for Weston Dynamo Electroplating & Electrotyping Machines, Newark, N. J.



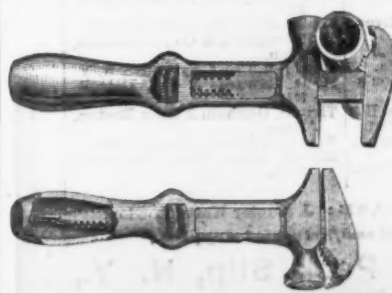
For Nickel, Bronze, Brass, Copper  
and Silver Plating.  
Over 2000 machines in use.  
Are used by all leading stove  
manufacturers.  
Experienced men sent to put  
up machines and instruct pur-  
chasers.

INFRINGEMENTS.  
We call attention to infringe-  
ments of the Weston Machine  
in which Automatic Switches  
are used to prevent change of  
current. The Weston Co. are  
owners by grant or purchase  
of all forms of Automatic  
Switches for Plating Machines.  
The adoption of these ma-  
chines will certainly lead to  
great loss to parties purchasing  
or using them.

MANUFACTURERS OF  
Cast Nickel Anodes, Pure  
Nickel Salts, Polishing  
Materials.

Manufactory, Newark, N. J. New York Office, 92 & 94 Liberty St.

## BOARDMAN'S PATENT COMBINATION WRENCH.



The Most Popular Combination  
Tool in the Trade.

Made in the most Thorough Manner, of the  
Best Material and Finish,

By **JOHN J. TOWER,**  
96 Chambers Street,  
NEW YORK.

R.W. MUSTARD.

## MUSTARD & CO.

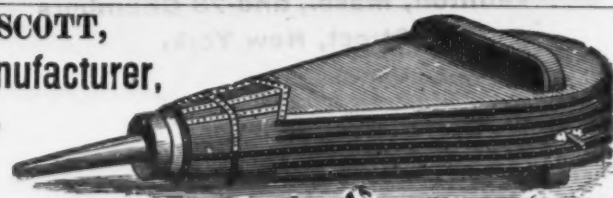
STOREKEEPERS,  
COMMISSION AGENTS  
and Importers of  
AMERICAN GOODS.  
SHANGHAI, CHINA.  
+ Consignments Solicited +

SAMPLES FORWARDED, FREE OF EXPENSE  
TO MANUFACTURERS, BY OUR REPRESENTATIVES  
IN AMERICA, MESS. SEELY & HOWELL, 14 STONE ST.  
NEW YORK CITY.

C.C. BENNETT.

## GEO. M. SCOTT, Bellows Manufacturer,

Johnson Street,  
Cor. 23d St.,  
CHICAGO, ILL.



## RIVETS C. F. HARRISON, RIVETS BOILER, BRIDGE & TANK CAYAHOGA FALLS, OHIO.

## ENAMEL PAINT CO.,

Correspondence Solicited.  
Quality Guaranteed.  
TRADE MARK.  
132 & 134 River Street,  
CLEVELAND OHIO.

## A. F. PIKE, Pike Station, N. H.

Manufacturer and Wholesale Dealer in  
**Bluestone**  
For Scaffolds, Axes, Knives and Turpentine Hacks  
Factories at Pike Station, N. H.  
and Evansville & Westmore, Vt.  
Genuine Old Reliable,  
Indiana Pond (Red End),  
Premium Union,  
White Mountain,  
Lafayette, Blackie,  
Diamond Girl,  
The New Boss,  
Lamotte, Kase,  
Willoughby Lake,  
Green Mountain,  
Black Diamond,  
Hewing Machine,  
German Pattern,  
Chocolate, A. X. Blue.  
Stones made, labeled and branded in any style de-  
sired. PRICE and QUALITY GUARANTEED. All the above  
brands are of clear, keen grit, and will not glaze.

## PAWTUCKET MFG. CO., PAWTUCKET, R. I.

STEEL MADE BOLTS TO ORDER  
MACHINE BOLTS  
OF ALL KINDS.  
Adapted for Cotton  
Woolen and other  
Machinery.

## Stud Bolts, Spring Bolts, Hook Bolts, Eye Bolts, &c.

COLD PUNCHED NUTS, WASHERS,  
CHAIN LINKS.

Set and Cap Screws, Strapping, Clearer  
Springs and Levers,  
Cold Punching to Order.

Elevator Bolts of  
All Kinds.  
Samples cheerfully  
Furnished.



raised to the third floor, some 40 feet above ground, and dumped upon an inclined platform, which feeds it to a giant crusher of the Blake pattern. In the jaws of this monster the masses are reduced to a uniform size, about corresponding with that of egg coal. It then goes through two smaller crushers in succession, and is finally passed between chilled rolls, which make it almost as fine as sand. It is then passed into a Conkling circular jig, where it is separated in the usual way.

At Lyon Mountain the company have quite a town already, and one which is destined to grow. It has at present a population of about 3000. Its public buildings include two churches, three schools, with a fourth in progress, a large store, a comfortable little hotel and a sort of general pleasure-house, where amusements and refreshments of a proper kind will be furnished cheaply. Within less than two years more than \$500,000 have been expended in plant and improvements on the company's property, which by no means represents the total investment.

As there is enough in and about Lyon Mountain to profitably occupy a visitor's attention for a week, an effort to see it all within a few hours must inevitably be attended with unsatisfactory results. Equally unsatisfactory must be any attempt at a description of the property based on notes hastily jotted down while running about from place to place, catching here and there disjointed facts and scraps of information from Mr. A. L. Inman, the general superintendent, and others of the management. Very little time was afforded for anything more than a look about, and then dinner was served at the hotel. This over, the party took carriages for a drive to Morris Junction via Belmont. The day had begun very cold, but grew more comfortable, although the long ride in open wagons was best enjoyed by those who were fortunate enough to secure blankets in which to wrap themselves. Thus protected, the party looked not unlike a visiting delegation of Indian braves, such as one sometimes sees doing Washington in carriages. However, the roads were good, having been laid with plank for ore cartage, the country was interesting and everybody enjoyed the ride. At Belmont a brief stop was made to see the largest forge in the country. In this there are 16 Catalan fires, of which the average in use is 14, giving a daily product of from 13 to 20 tons of blooms for fine steel purposes, and which for quality have a reputation only equaled by that of one or two brands of Norway iron. Perhaps the most interesting feature of this establishment is the blowing engine, with its three oscillating cylinders driven by a 44 inch Laffel turbine. As these have their pistons connected with a common crank, their strokes cannot coincide. They deliver the blast under a very steady pressure of about 2 pounds, the pressure gauge showing no perceptible variation. In their several works the company produce 17,000 tons of billets and blooms per annum; last year their ore production was 150,000 tons. Plattsburgh is the shipping port.

Having seen all there could be shown them in a day, and gained enough information to convince every one that the Chateaugay deposit is one of the very greatest importance, the party returned to Plattsburgh by train. On the way thither the writer recalled with fresh interest a letter written by Mr. Jas. A. Burden to Mr. Smith M. Weed, under date of October 9, 1882, and published in *The Iron Age* of October 26. What may have seemed to many an exaggerated estimate of the possibilities of Chateaugay became, in the light of knowledge gained, the safe and reasonable estimates of a clear-headed and cautious business man of large experience. As what Mr. Burden said in that letter has gained added interest from what precedes, we cannot do better than make room for a quotation therefrom:

This property alone, from the veins already explored, is capable in the opinion of a competent authority who has had the experience and the opportunity to judge of its resources of producing 6,000,000 tons of Bessemer steel ore per annum. While this is the maximum output of the mine, yet, for the purpose of my argument, I will assume the possible output to be only one-half of this quantity, which is certainly making a conservative estimate for "faute" and other irregularities in the deposits. I therefore call the possible annual output of the Chateaugay mines 3,000,000 tons, 2 tons of which will make a ton of the highest quality of Bessemer pig iron; and should an iron ore of higher quality be found in the future, the Chateaugay Company could supply a 50 per cent. ore or a 60 per cent. concentrated ore of the quality above referred to. Judging from the production from the 1st of January to the 1st of September, 1882, I estimate that the production of the Bessemer steel works east of the Allegheny Mountains, for the entire year of 1882, will be about 600,000 tons of finished Bessemer steel of all kinds, including rails—which would require about 600,000 tons of pig iron in its manufacture, and to produce this amount of pig iron, about 1,600,000 tons of Chateaugay ore would be required. Assuming the annual output of the Chateaugay mine to be 3,000,000 tons, as I have already stated, it will be seen that the Chateaugay Ore and Iron Co. alone can supply 1,800,000 tons in excess of the total quantity required for Bessemer steel purposes east of the Allegheny Mountains. I estimate that the production of all the Bessemer steel works in the United States for the year 1882 will be about 1,800,000 tons of finished Bessemer steel of all kinds, including rails, which would require in its manufacture about 2,000,000 tons of pig iron; to produce this amount of pig iron, 4,200,000 tons of Chateaugay ore would be required, or only 1,400,000 tons in excess of a possible output of the Chateaugay district. It may be asked whether this ore can be mined and sent to market at a price which will bring it within reach of the ore consumers. It is a sufficient reply to this that the Chateaugay Ore and Iron Co. are now delivering their ore to their customers at \$1.50 per ton of 2240 pounds, at Plattsburgh, on Lake Champlain, and guarantee that 2 tons of the ore will make 1 ton of pig iron. The freight from Plattsburgh to tidewater on the Hudson is \$1 per ton of 2240 pounds, and from the Hudson low rates of freight by water can be had to Pennsylvania, New Jersey and other iron-making districts.

Large as these figures may seem, they are fairly and demonstrably within the truth. Considering the Hudson River and Chateaugay deposits together, their united value to the Eastern iron trade is simply inestimable. Used together these ores make a mixture possessing all the advantages which could be desired. We have seen all the great iron-ore deposits thus far developed in this country, and are measurably well informed as to the special advantages of cheap iron production claimed by various districts, but taking everything into consideration, and basing estimates on cost and transportation charges simply, we have yet to hear of a place where iron can be made and marketed more cheaply than on the shores of New York Bay or along the banks of the Hudson River. In fact, we

know of no location possessing equal advantages.

At Plattsburgh the party were entertained at supper by the proprietor of the Foquet House, and later in the evening had some rare fun in their own dining-car, with speeches and the presentation of testimonials to favored members of the company. Among the gifts dispensed were a piece of plate to Mr. Thomas Dickson, a supply of anthracite to Mr. Jas. A. Burden, a pith helmet to Mr. J. J. Albright, a membership in the Cobden Club to Col. Le Grand B. Cannon and a diamond bosom pin to Mr. Samuel Thomas. For further particulars these gentlemen may be consulted.

At 9.45 next morning the party, refreshed and rested, were carried to Crown Point furnaces, where a brief stop was made. These furnaces are too well known to our readers to need description. They are working very well on a half-and-half mixture of Chateaugay and Crown Point, and 30 per cent. Blossburg coke to 70 per cent. anthracite. The larger furnace has been run up to 100 tons a day, and during six weeks averaged 85½ tons, receiving a little over 12,000 feet of air per minute, at a temperature of 1000°. The magnetite mixture above mentioned was smelted with 1 ton 5 cwt. of fuel to the ton of pig.

The remainder of the trip must be very briefly described, not because it lacked interest, but because so much space has been given to the two great ore deposits that but little remains for the incidental features of the trip, which were somewhat too hurriedly seen to give material for notes of value. From Crown Point the party were carried to Troy, where time was given for a run through the Burden Iron Co.'s works. The admirable system, perfect order and phenomenal cleanliness of the several departments were noted with surprise and pleasure, and the new offices were much admired. The special train ran to Albany, where a delightful dinner was served in the dining-car, and the night was passed comfortably at the Delavan. Friday morning the home run began on the track of the Delaware and Hudson Co.'s road, with Scranton as the first objective point. Here the party were taken in carriages to the elegant new shops of the Dickson Mfg. Co., which were illustrated and described in *The Iron Age* of April 26, 1883. The locomotive shops of the company were then visited, and finally their blast furnaces, with a run on the way thither through the steel works of the Lackawanna Iron and Steel Co. From Scranton to New York two director's cars accommodated the 14 gentlemen who remained to complete the round trip, and, as we have already intimated, this little company had fun enough to the mile to add a great deal to the average of the whole trip. Mr. Austin G. Gorham was the best possible organizer of such sports, and about him the whole party gathered by a common instinct. Songs, stories and a series of most unconventional speeches passed the time so pleasantly that Hoboken was reached all too soon, but not until the following motion, duly offered and seconded, was put by Mr. A. Williams, and carried with boisterous enthusiasm:

Resolved, That we make a like excursion next year to the Hudson River and Chateaugay Mines.

Resolved, That this resolution be published in the *The Iron Age*.

In concluding this hasty and unsatisfactory story of the trip, we think it but just to Mr. D. M. Kendrick, General Passenger Agent of the Delaware and Hudson Canal Co., to say that its complete success is due to the executive ability displayed by him in its management. The distance traversed was, we believe, about 1050 miles. During the entire trip there was not one accident, mishap or delay. Everything was carried out exactly as planned, the arrangements were perfect in every detail, and there was not one unpleasant incident from beginning to end. Mr. Kendrick organized and managed the excursion throughout, and supplemented his efforts by carrying sunshine wherever he went. A better or brighter man than Mr. Kendrick is yet to be found, and we suspect he is not yet born.

#### The Du Puy Direct Process.

To the Editor of *The Iron Age*: The comments in your paper of the 11th inst. upon the recent tests of magnetic-iron sand by Mr. Menzies in the Siemens rotator at Landore, are, I think, somewhat calculated, unintentionally, to convey a wrong impression, and generally to prejudice the use of direct processes.

Your statement "that the chemical results of direct processes have always been good" is quite correct, for some of the most experienced steel makers, both here and in Europe, have arrived at this conclusion after a series of very careful tests. "Direct" iron melted in crucibles has been found equal in every respect to the best steel made from the best brands of Swedish iron, while in the open-hearth, in large quantities, with the usual pig bath, the quality has proved itself unsurpassed excellence. The only point not yet satisfactorily settled, in the judgment of manufacturers, is the certain commercial economy of direct iron for steel uses, and this doubt perhaps I may help to clear up by contributing herewith some facts which as yet have not been brought to public attention.

My direct method of operating is mechanically to press the ore or cinder mixtures into molded shapes of about 8½ by 9 inches, by 17 inches in length. In order to secure a quick heat penetration they are so perforated in molding that no part of them exceeds 2 inches in thickness. It is found that molds of this size contain 100 pounds of separated magnetic-iron sand, besides the carbon, &c., mingled with it. When they are placed on end, spaced a few inches apart over the bottom of a furnace like an ordinary double puddling furnace, in three hours, without materially changing shape, and without labor upon them other than to keep up a reducing heat, they will be changed to iron. This iron will readily stick together, may be balled to the desired weight, squeezed to blooms, and without reheating rolled to long smooth bars.

Last year Mr. David Reeves, president of the Phoenix Iron Co., directed several old single heating furnaces to be rearranged at

Safe Harbor, where his company were then manufacturing puddle bar. These furnaces had about 28 square feet in the clear bottom surface. They were run continuously on this process night and day, week in and week out. They each regularly made six heats every 24 hours. The actual time of the six heats, including the cleaning of the grate bars, was about 20 hours, the furnaces being generally idle in all about 4 hours out of the 24, between the turns. The wear and tear of these furnaces was found to be about the same as in puddling pig iron. Not only were molds of rich magnetic ore reduced, forged and rolled to bars at one heat from these furnaces, but also refractory puddle cinders, squeezer cinders, and the general run of rail cinders, as well as lean ores. These materials were all tested separately and together, and alike were all squeezed and rolled to long bars at one heat. It was found that by this process about 500 pounds in bars could be made at a heat from these refractory cinders. The furnace capacity, however, was proved to be too small. As so little labor was required at the furnace the operator could readily have taken care of three times the weight of metal, had its size been sufficient to contain the material. Besides this, the heats were somewhat retarded in these furnaces by the direct firing. Every charge of fresh fuel on the grates perceptibly oxidizes some iron, as well as lowers the temperature of the furnace for the time being.

In gas furnaces with reversing valves the reducing heat is more uniformly maintained and controlled, and with a more economical consumption of fuel. Added to this, gas furnaces may be of much larger capacity, and, there being no direct firing to chill and waste the metal, or delays in order to clean grate bars, the heats may be hastened to less than three hours. Experience has determined that this process may be best operated in gas furnaces of about 6½ to 7 feet width, and about 20 feet length clear in the bottom. Such furnaces will readily contain room molds, and as each mold is found to contain 100 pounds of magnetic-iron sand, the furnace charge may be about 10,000 pounds at a heat. Now, it has been proved that rich magnetic ore reduced in gas furnaces had produced over one-half its weight in blooms; hence it is reasonable to expect that, with separated magnetic-iron sand, these furnace charges will turn out 5000 pounds at a heat, or 30,000 pounds of iron in six heats every 24 hours.

The consumption of fuel for gas furnaces of the size referred to for heating blooms—which require a much higher heat than the reduction of ore—warrants the conclusion that 1 ton of coal will be sufficient to produce 1 ton of blooms, or that the 30,000 pounds of blooms made from magnetic-iron sand in 24 hours will require about 30,000 pounds of coal. With leaner material than these magnetic sands, of course the furnace output will be proportionally less. The cost of gas furnaces of this size, including producers, &c., all complete, will not exceed \$8000. If rich lump ore is used, the cost of crushing and grinding it will be about \$1.50 per ton in bars more than if made from the prepared iron sand.

Without needlessly further consuming your space, suffice it to say that what I have herein stated may be easily proved, item by item. I am prepared to show that, with a properly arranged and systematized plant, located at a point where material may be obtained at moderate prices, the cost of direct iron in blooms will likely be very little over the cost of pig iron. The low cost of such direct blooms, now recognized to be equal in quality to Swedes iron, for which steel makers are now paying an average of \$80 per ton, would seem to commend this manufacture as a new and specially profitable industry. Particularly at the present time may this be the case, when, under our new tariff, English steels of fine quality are likely to flood the market, to the serious damage of the domestic production. Our exceptionally rich ores, which are preferable for this process, should secure us the advantage over England by this mode of working, because in England rich ores must be imported from Sweden or elsewhere, while we have them at home.

#### INDUSTRIAL ITEMS.

##### RHODE ISLAND.

Mr. Corlies is building, at his works in Providence, two engines of 500 horse-power each, for the Social Mfg. Co., in Woonsocket.

##### MASSACHUSETTS.

The Co-operative Foundry Co., of Somerset, have a working capital of \$55,000, and their sales last year reached \$75,000. The company have abundant orders for their wares.

A new machine has been completed at Milford for making and driving a clinching screw. It makes the screw direct from a coil of wire and drives it immediately, saving all handling of the fastenings. It will make various sizes of screws, and the change from one size to another is by simply moving a lever. So rapidly does it perform its work that it will make and drive double the number of fastenings that could be made alone by the original machine, thus effecting a great saving of labor.—*Boston Commercial Bulletin*.

The manufacture of jewelers' tools and screws has been commenced at Mansfield.

The stocking mills at Harvard are to be used for the manufacture of cutlery.

The Helios Electric Light Co. have been organized, with \$150,000 capital, to make dynamo-electric machines for lighting and power, and have commenced work in their shops at Boston.

##### PENNSYLVANIA.

The Dickson Mfg. Co., of Scranton, have been awarded the contract to furnish the Calumet and Hecla Mining Co., of Lake Superior, Mich., with a steel boiler 90 inches in diameter, 36 feet in length and to carry 150 pounds pressure. The total weight of this boiler will be 108,000 pounds, and the castings for it will weigh 10 tons. It will have 100 3-inch tubes. It is to be made of ¾-inch steel plate, furnished by the mining company

to the Dickson Mfg. Co., after testing every plate prior to delivery. The boiler was designed by Mr. E. D. Leavitt, Jr., of Cambridgeport, Mass.

Business is active at the Tenth street foundry of the Reading Hardware Co., and it is possible that it may be continued in operation after the repairs at the Sixth street foundry are completed and it resumes work.

Potts Brothers, of Pottstown, have refused the request of their men that they be paid every two weeks instead of monthly. The firm state that the change would entail additional office expenses, which the present state of the iron business would not warrant, and that the most essential object in now running the mill is to give employment to the men.

The Co-operative Iron and Steel Works have started up their works on steel rails, turning out a small order last week.

The anthracite coal companies have agreed to work full time at the coal mines this week, half time next week, full time the following week, half time the week ending June 9, full time for the week ending June 16, and half time for four weeks following.

William McIlvain & Sons have commenced running their rolling mill in Reading five days per week.

The Pennsylvania Graphite Works, at Byer's Station, on the Pickering Valley Railroad, owned by the Messrs. Young, of Reading, which have been standing idle for several months, are to be put in operation again about the first of June. The company disposed of their works some time ago, and since then they have been in litigation. Matters have now been settled and the works will soon be put in operation.

The mechanical puddler of the Phoenix Iron Co., of Phoenixville, is working well since it was put in operation the last time. The great trouble now appears to be with the smelting furnace in connection with it. The company made another experiment last week, which has thus far worked well, which was to put the pig metal in the puddler and melt it there. When the iron is in a molten state the puddler is put in motion and the mass puddled.

Considerable activity is displayed around the Montour Iron and Steel Co.'s works, at Danville, and preparations are being made to resume operations in a short time.

It is stated that representatives of the De Pauws, of New Albany, Ind., have expressed their willingness to build large glass works at Washington, if they can have sufficient land donated for the purpose.

Topton Furnace, in Berks County, is being slowly repaired.

The large "coke pusher" being built at Scott Foundry for Robert H. Powell, Powelton, is nearly finished, and temporary shedding has been erected in the yard of the works, under which the machinery is being put together. The coke pusher will be operated by two engines. A blowing engine for the Powellton Furnace is also being built at the Scott Works. The sugar mill, composed of castings weighing many tons, is also nearly completed. Two of the 90-inch cotton presses have been shipped, and work on the 80-inch cotton press has been resumed.—*Reading Eagle*.

On Monday of last week the Pittsburgh Steel Casting Co. turned out in 10 hours 62 tons of 2240 pounds of steel blooms, none of them larger than 4 x 4 inches—a big output.

The Pennsylvania Bolt and Nut Works, recently established in Lebanon by Reading parties, went on double turn on Wednesday night, this step having been rendered necessary on account of more orders having been received than can be filled with the present stock on hand.

A fire broke out between 12 and 1 o'clock on the morning of May 17 in the shaft of the Blair Iron and Coal Co., at the opposite end of the P. R. R. tunnel from Galitzen. Three hundred tons of coal in the tipples, machinery, &c., are almost a total loss. The company's loss is probably \$40,000. This will throw 300 men and boys out of employment for at least 60 days. It is presumed the company will put an incline plane up to supply the wants of the shaft. The disaster will seriously embarrass the labor and business interests of Galitzen for some time. The cause of the fire is unknown at present.

##### MISSOURI.

The Hooker-Colville Steam Pump Co., of St. Louis, have occupied their new building in that city.

The Midland Blast Furnace Co. are about to increase their capital stock from \$150,000 to \$300,000.

The Paddock-Hawley Iron Co. shipped last week 100 blacksmith vises of their manufacture to San Francisco via New York and Cape Horn.

##### OHIO.

The new works of the Metropolitan Stove Co., of Ashtabula, will be erected and machinery put in this season. A. A. Southwick, of Ashtabula, is secretary and treasurer.

A new Youngstown enterprise is the Novelty Works, for the operation of which a stock company is being formed. They expect to manufacture iron and brass castings of every description, and intend to be ready for business in a few days.

The Briar Hill Iron Co. have leased Ella Furnace, at Sharon, Pa., for such time as it will take to work up 25,000 tons of iron ore. In the meantime the company are fitting up their furnace at Briar Hill.

By satisfactory arrangement, the Cuyahoga Falls wire-mill property passes into the hands of Selah Reeve.

The Spaulding Iron Co., at Brilliant, have succeeded in striking gas after boring to the depth of 1300 feet. This find has been the means of creating a "boom" in boring for gas in the vicinity of Brilliant and Steubenville. The Brilliant Glass Works and the

Jefferson Iron Co. are among those who are reported about to drill.

Lambert Bros., of Ironton, have the contract for 33 new nail machines for the Belfont Iron Works Co., and engines, &c., for their improvements. They have all the work they can handle, and have increased their force of machinists.

The Cherry Valley mills are now successfully rolling angle iron.

The new mill of the Kelly Nail and Iron Co., at Ironton, is rapidly approaching completion. It will contain 16 boiling furnaces.

A Canton dispatch says the Diebold Safe & Lock Co., of that city, intend to erect a large factory in Cleveland if a suitable location can be found. It is the purpose of the company to run it in connection with their mammoth works there, and use it for the construction of burglar-proof work only.

It is announced that the Cleveland creditors of Brown, Bonnell & Co. have very generally signed the agreement for the reorganization of that firm. Creditors representing more than \$800,000 of the liabilities have now signed the agreement, and there is no doubt of it being carried fully into effect.

The Cummer Engine Co., of Cleveland, are building a 150-horse-power engine, to be used in running a line of shafting at the Louisville Exhibition. They are also building a 500-horse-power engine for the Brush Electric Light Co., of that city, a 125-horse-power engine for Messrs. Taylor & Bogg, of the same place, and a 60-horse-power engine for the Nordyke & Mormon Co., of Indianapolis, Ind. The prospects, as reported by the company, are very flattering.

The E. D. Clapp Mfg. Co., of Auburn, N. Y., recently shipped to Messrs. George Enger & Co., of Cincinnati, a carload of carriage irons—1500 complete sets. Messrs. Enger & Co. have been running about three years, and have now one of the largest factories in the West. It is estimated that their production this year will reach some 10,000 buggies.

##### MICHIGAN.

The Collium Furnace Co., of Detroit, inform us that they have now about 100 of their cupolas at work, which are giving highly flattering results wherever they are in operation. They are now used by the Michigan Car Wheel Co., of Detroit; the Pullman Car Wheel Co., of Pullman, Ill., and a number of other establishments.

##### VIRGINIA.

Mr. T. J. Sublett, of the firm of J. T. Sublett & Bros., dealers in builders' hardware, mechanics' tools, &c., of Richmond, has issued a notice to the effect that he has sold his interest in the concern. Messrs. George W. and Walter S. Sublett also have issued a notice stating that they have associated themselves under the firm name and style of George W. Sublett & Co., and will hereafter conduct the establishment.

##### ILLINOIS.

The converting and rail-mill departments of the Joliet Steel Co.'s works, at Joliet, started up on May 14. The repairs to the center-pit crane in the converter have been made and the foundations for the rolls relined. The merchant mill is not running.

The Rockford Silver Plate Co. have been granted the exclusive right to manufacture the United States Jewellers' Guild goods for six years from date. This is a big credit mark for the company.

J. J. Ryan & Co., brass founders, of Chicago, are occupying their new works in that city. These works have a capacity for turning out 9000 pounds of brass castings a day. The firm are just completing a contract for 5000 pounds of special castings for the Chicago City Railway Co.

The converting works and rail-mill departments of the Chicago works of the North Chicago Rolling Mill Co. started up last week with from 700 to 800 men. All other departments of their works at South Chicago and Bay View, Wis., are in operation.

James McAndrews, manufacturer of spelter, Babbitt metal and brass castings, has purchased ground in Chicago, upon which he will commence the erection of a galvanizing works 75 by 125 feet. The galvanizing of sheet-iron pipe, wire and castings will be made a specialty.

#### Opening the East River Bridge.

Preparations for the formal opening of the East River Bridge are now complete, and the event will be signaled by a grand pyrotechnic display, which will form the special feature of the occasion. Of forensic display there will be no lack, Mayor Low, of Brooklyn, having interested himself actively to see that there shall be no default on the part of Government officials or private citizens in this respect. After dining with the Mayor at his private residence, President Arthur and Governor Cleveland will accompany him to the Academy of Music, in Montague street, to share in the evening's ovation. All the public buildings, both in New York and Brooklyn, will be gallantly decorated, but it is probable that no excess of adulation will be wasted on the part of the authorities of New York, out of deference to the keen susceptibilities of our Celtic population, who find in the simultaneous occurrence of the Queen's Birthday celebration and the Bridge opening a most unfortunate coincidence. The electric illumination of the bridge last Saturday night formed a magnificent spectacle. When, in addition to about 80 powerful lamps, the assembled thousands who will to-night cover the house-tops and throng the river, witness the flight of numberless bombs and rockets, together with gold and silver rain and floating stars, the effect will challenge the highest powers of description. Happy will it be if no fatal collision of steamers, or other unfortunate event, mars the festivities. If Colonel Roebing could step forth from his chamber, with firm tread and head erect, to take part in the celebration of a work with which his name and that of his father will be forever associated, the people of both cities would be more than happy to do him honor. His unfortunate illness is just now doubly pathetic.











Total re-	80,973,102	82,504,000	Inc.	1,530,897
Deposits	203,197,100	337,935,500	Inc.	3,497,400
Reserve re-	75,839,275	76,778,375	Inc.	939,100
Revenue	5,003,824	5,710,375	Inc.	706,551
Circulation	16,988,400	18,151,100	Inc.	1,162,700

MINING STOCKS.

The closing quotations for mining stocks were as follows:

	Mid.	Asked.
Amie.	17	18
Alcoa.	3	3 1/2
Alta. Mont.	12	13
Hale & Nor.	4	4 1/2
Belle Isle.	12	13
Best & Bel.	4 1/2	5
Bodie.	100	105
B. H. & E.	10	11
Bradshaw.	35	36
Calced. B. H.	76	77
California.	24	25
Climax.	6	6 1/2
Con. Imp.	6	6 1/2
Con. Va.	69	70
Con. Coal.	23 1/2	24
Chrysolite.	1.10	1.15
Central Ark.	25	26
Cherokee.	4	4 1/2
Dalhousie.	4	4 1/2
Durango.	5	5 1/2
Decatur.	3	3 1/2
East. Or.	21	22
Elko Con.	18	19
Findly.	5	5 1/2
G. Prize.	95	100
Gr. Mtn.	81	85
Gold Stripe.	8	8 1/2
Honestake.	13 1/2	14
Hull.	6	6 1/2
Horn Silver.	6 1/2	6 3/4
Harlem.	1.49	1.50
Hibernia.	4	4 1/2
Hortons.	12	13
Half-And.	1 1/2	1 3/4
Independence.	20	21
Iron Silver.	3.00	3.05
Leadville, Con.	55	56
L. Pitts.	70	71
L. Chief.	30	31
Quick Silver.	8	8 1/2
Ophir.	3.00	3.05
Maryland Coal.	1.10	1.15
McKean.	3.85	3.90
Navajo.	1.80	1.85
N. Belle.	5.75	5.80
N. Standard.	7	7 1/2
Oil & Mill.	1.10	1.15
Pine Line.	1.01 1/2	1.02 1/2
Rappanahock.	6	6 1/2
Rodinson Con.	82	83
Sierra Nevada.	1.10	1.15
Silver King.	10 1/2	11
Standard.	6.00	6.05
Sutro Tm.	19	20
Sonora Con.	61	62
So. Hite, new.	10	11
So. Pacific.	7	7 1/2
St. L. & C.	5	5 1/2
Union Con.	6.50	6.55

GENERAL HARDWARE.

There is little to note this week in regard to the hardware market. Business goes on quietly, and the amount of goods distributed is quite up to what should be expected. No important changes of prices have taken place.

The demand for Nails has been large during the week, and stocks have become light, though pretty well assorted. Considerable inquiries have come from California, as well as other distant points, and the export business is assuming an importance it has not had for some time. Many dealers are refusing orders except from regular customers, and some of them have been in the market to replenish their own stocks. While \$3.10, less 10 cents to the trade, remains the usual price for small lots, much less concession would be made for a large order. The trade are really speculating on the chances of a strike in the West. If this should occur, prices are likely to go up; otherwise there will probably be a reaction.

We call attention to the card, on page 28, of Hussey, Binns & Co., manufacturers of Shovels, Spades and Scoops, Pittsburgh, Pa., who make, and unconditionally warrant, a line of Hammered Solid Cast Steel Shovels and Spades without welds or rivets, and each tool from a single ingot of Cast Steel; also the only Smooth Back Solid Cast Steel Locomotive and Coal Scoops, for which they have letters patent. These grades they sell largely to leading railway and construction companies in this and foreign countries, and their trade is rapidly growing. To meet the wants of all sections, they make a full line of Iron, Steel and Cast Steel Shovels, Spades and Scoops, Mining Shovels, &c., of all grades and descriptions. Durrie & McCarty, No. 97 Chambers street, are the New York agents, and will furnish catalogues and prices on application.

On the 16th inst. the following prices for Cordage were adopted, being a reduction of half a cent per pound. They are subject to the usual discount to the trade of 1 cent per pound:

	Cents.
Manila Cordage, sizes above 12 th'd and Hay	15 1/2
Manila Cordage, 12 th'd (3/4 in. diam.)	15 1/2
Manila Cordage, 10 th'd (3/4 in. diam.)	15 1/2
Manila Cordage, 8 th'd (3/4 in. diam.)	15 1/2
Manila Cordage, 6 th'd (3/4 in. diam.)	15 1/2
Manila Cordage, 4 th'd (3/4 in. diam.)	15 1/2
Manila Cordage, 2 th'd (3/4 in. diam.)	15 1/2
Manila Cordage, 1 th'd (3/4 in. diam.)	15 1/2
Manila Cordage, 1/2 th'd (3/4 in. diam.)	15 1/2
Manila Cordage, 1/4 th'd (3/4 in. diam.)	15 1/2
Manila Cordage, 1/8 th'd (3/4 in. diam.)	15 1/2
Manila Cordage, 1/16 th'd (3/4 in. diam.)	15 1/2
Manila Cordage, 1/32 th'd (3/4 in. diam.)	15 1/2
Manila Cordage, 1/64 th'd (3/4 in. diam.)	15 1/2
Manila Cordage, 1/128 th'd (3/4 in. diam.)	15 1/2
Manila Cordage, 1/256 th'd (3/4 in. diam.)	15 1/2
Manila Cordage, 1/512 th'd (3/4 in. diam.)	15 1/2
Manila Cordage, 1/1024 th'd (3/4 in. diam.)	15 1/2
Manila Cordage, 1/2048 th'd (3/4 in. diam.)	15 1/2
Manila Cordage, 1/4096 th'd (3/4 in. diam.)	15 1/2
Manila Cordage, 1/8192 th'd (3/4 in. diam.)	15 1/2
Manila Cordage, 1/16384 th'd (3/4 in. diam.)	15 1/2
Manila Cordage, 1/32768 th'd (3/4 in. diam.)	15 1/2
Manila Cordage, 1/65536 th'd (3/4 in. diam.)	15 1/2
Manila Cordage, 1/131072 th'd (3/4 in. diam.)	15 1/2
Manila Cordage, 1/262144 th'd (3/4 in. diam.)	15 1/2
Manila Cordage, 1/524288 th'd (3/4 in. diam.)	15 1/2
Manila Cordage, 1/1048576 th'd (3/4 in. diam.)	15 1/2
Manila Cordage, 1/2097152 th'd (3/4 in. diam.)	15 1/2
Manila Cordage, 1/4194304 th'd (3/4 in. diam.)	15 1/2
Manila Cordage, 1/8388608 th'd (3/4 in. diam.)	15 1/2
Manila Cordage, 1/16777216 th'd (3/4 in. diam.)	15 1/2
Manila Cordage, 1/33554432 th'd (3/4 in. diam.)	15 1/2
Manila Cordage, 1/67108864 th'd (3/4 in. diam.)	15 1/2
Manila Cordage, 1/134217728 th'd (3/4 in. diam.)	15 1/2
Manila Cordage, 1/268435456 th'd (3/4 in. diam.)	15 1/2
Manila Cordage, 1/536870912 th'd (3/4 in. diam.)	15 1/2
Manila Cordage, 1/1073741824 th'd (3/4 in. diam.)	15 1/2
Manila Cordage, 1/2147483648 th'd (3/4 in. diam.)	15 1/2
Manila Cordage, 1/4294967296 th'd (3/4 in. diam.)	15 1/2
Manila Cordage, 1/8589934592 th'd (3/4 in. diam.)	15 1/2
Manila Cordage, 1/17179869184 th'd (3/4 in. diam.)	15 1/2
Manila Cordage, 1/34359738368 th'd (3/4 in. diam.)	15 1/2
Manila Cordage, 1/68719476736 th'd (3/4 in. diam.)	15 1/2
Manila Cordage, 1/137438953472 th'd (3/4 in. diam.)	15 1/2
Manila Cordage, 1/274877906944 th'd (3/4 in. diam.)	15 1/2
Manila Cordage, 1/549755813888 th'd (3/4 in. diam.)	15 1/2
Manila Cordage, 1/1099511627776 th'd (3/4 in. diam.)	15 1/2
Manila Cordage, 1/2199023255552 th'd (3/4 in. diam.)	15 1/2
Manila Cordage, 1/4398046511104 th'd (3/4 in. diam.)	15 1/2
Manila Cordage, 1/8796093022208 th'd (3/4 in. diam.)	15 1/2
Manila Cordage, 1/17592186044416 th'd (3/4 in. diam.)	15 1/2
Manila Cordage, 1/35184372088832 th'd (3/4 in. diam.)	15 1/2
Manila Cordage, 1/70368744177664 th'd (3/4 in. diam.)	15 1/2
Manila Cordage, 1/140737488355328 th'd (3/4 in. diam.)	15 1/2
Manila Cordage, 1/281474976710656 th'd (3/4 in. diam.)	15 1/2
Manila Cordage, 1/562949953421312 th'd (3/4 in. diam.)	15 1/2
Manila Cordage, 1/1125899906842624 th'd (3/4 in. diam.)	15 1/2
Manila Cordage, 1/2251799813685248 th'd (3/4 in. diam.)	15 1/2
Manila Cordage, 1/4503599627370496 th'd (3/4 in. diam.)	15 1/2
Manila Cordage, 1/9007199254740992 th'd (3/4 in. diam.)	15 1/2
Manila Cordage, 1/18014398509481984 th'd (3/4 in. diam.)	15 1/2
Manila Cordage, 1/36028797018963968 th'd (3/4 in. diam.)	15 1/2
Manila Cordage, 1/72057594037927936 th'd (3/4 in. diam.)	15 1/2
Manila Cordage, 1/144115188075855872 th'd (3/4 in. diam.)	15 1/2
Manila Cordage, 1/288230376151711744 th'd (3/4 in. diam.)	15 1/2
Manila Cordage, 1/576460752303423488 th'd (3/4 in. diam.)	15 1/2
Manila Cordage, 1/1152921504606846976 th'd (3/4 in. diam.)	15 1/2
Manila Cordage, 1/2305843009213693952 th'd (3/4 in. diam.)	15 1/2
Manila Cordage, 1/4611686018427387904 th'd (3/4 in. diam.)	15 1/2
Manila Cordage, 1/9223372036854775808 th'd (3/4 in. diam.)	15 1/2
Manila Cordage, 1/18446744073709551616 th'd (3/4 in. diam.)	15 1/2
Manila Cordage, 1/36893488147419103232 th'd (3/4 in. diam.)	15 1/2
Manila Cordage, 1/73786976294838206464 th'd (3/4 in. diam.)	15 1/2
Manila Cordage, 1/147573952589676412928 th'd (3/4 in. diam.)	15 1/2
Manila Cordage, 1/295147905179352825856 th'd (3/4 in. diam.)	15 1/2
Manila Cordage, 1/590295810358705651712 th'd (3/4 in. diam.)	15 1/2
Manila Cordage, 1/1180591620717411303424 th'd (3/4 in. diam.)	15 1/2
Manila Cordage, 1/2361183241434822606848 th'd (3/4 in. diam.)	15 1/2
Manila Cordage, 1/4722366482869645213696 th'd (3/4 in. diam.)	15 1/2
Manila Cordage, 1/9444732965739290427392 th'd (3/4 in. diam.)	15 1/2
Manila Cordage, 1/18889465931478580854784 th'd (3/4 in. diam.)	15 1/2
Manila Cordage, 1/37778931862957161709568 th'd (3/4 in. diam.)	15 1/2
Manila Cordage, 1/75557863725914323419136 th'd (3/4 in. diam.)	15 1/2
Manila Cordage, 1/151115727451828646838272 th'd (3/4 in. diam.)	15 1/2
Manila Cordage, 1/302231454903657293676544 th'd (3/4 in. diam.)	15 1/2
Manila Cordage, 1/604462909807314587353088 th'd (3/4 in. diam.)	15 1/2
Manila Cordage, 1/1208925819614629174706176 th'd (3/4 in. diam.)	15 1/2
Manila Cordage, 1/2417851639229258349412352 th'd (3/4 in. diam.)	15 1/2
Manila Cordage, 1/4835703278458516698824704 th'd (3/4 in. diam.)	15 1/2
Manila Cordage, 1/9671406556917033397649408 th'd (3/4 in. diam.)	15 1/2
Manila Cordage, 1/19342813113834066795298816 th'd (3/4 in. diam.)	15 1/2
Manila Cordage, 1/38685626227668133590597632 th'd (3/4 in. diam.)	15 1/2
Manila Cordage, 1/77371252455336267181195264 th'd (3/4 in. diam.)	15 1/2
Manila Cordage, 1/154742504910672534362390528 th'd (3/4 in. diam.)	15 1/2
Manila Cordage, 1/309485009821345068724781056 th'd (3/4 in. diam.)	15 1/2
Manila Cordage, 1/618970019642690137449562112 th'd (3/4 in. diam.)	15 1/2
Manila Cordage, 1/1237940039285380274899124224 th'd (3/4 in. diam.)	15 1/2
Manila Cordage, 1/2475880078570760549798248448 th'd (3/4 in. diam.)	15 1/2
Manila Cordage, 1/4951760157141521099596496896 th'd (3/4 in. diam.)	15 1/2
Manila Cordage, 1/9903520314283042199192993792 th'd (3/4 in. diam.)	15 1/2
Manila Cordage, 1/19807040628566084398385987584 th'd (3/4 in. diam.)	15 1/2
Manila Cordage, 1/39614081257132168796771975168 th'd (3/4 in. diam.)	15 1/2
Manila Cordage, 1/79228162514264337593543950336 th'd (3/4 in. diam.)	15 1/2
Manila Cordage, 1/158456325028528675187087900672 th'd (3/4 in. diam.)	15 1/2
Manila Cordage, 1/316912650057057350374175801344 th'd (3/4 in. diam.)	15 1/2
Manila Cordage, 1/633825300114114700748351602688 th'd (3/4 in. diam.)	15 1/2
Manila Cordage, 1/1267650600228229401496703205376 th'd (3/4 in. diam.)	15 1/2
Manila Cordage, 1/2535301200456458802993406410752 th'd (3/4 in. diam.)	15 1/2
Manila Cordage, 1/5070602400912917605986812821504 th'd (3/4 in. diam.)	15 1/2
Manila Cordage, 1/10141204801825835211973625643008 th'd (3/4 in. diam.)	15 1/2
Manila Cordage, 1/20282409603651670423947251286016 th'd (3/4 in. diam.)	15 1/2
Manila Cordage, 1/40564819207303340847894502572032 th'd (3/4 in. diam.)	15 1/2
Manila Cordage, 1/81129638414606681695789005144064 th'd (3/4 in. diam.)	15 1/2
Manila Cordage, 1/162259276829213363391578010288128 th'd (3/4 in. diam.)	15 1/2
Manila Cordage, 1/324518553658426726783156020576256 th'd (3/4 in. diam.)	15 1/2
Manila Cordage, 1/649037107316853453566312041152512 th'd (3/4 in. diam.)	15 1/2
Manila Cordage, 1/1298074214633706907132624082305024 th'd (3/4 in. diam.)	15 1/2
Manila Cordage, 1/2596148429267413814265248164610048 th'd (3/4 in. diam.)	15 1/2
Manila Cordage, 1/5192296858534827628530496329220096 th'd (3/4 in. diam.)	15 1/2
Manila Cordage, 1/10384593717069655257060992658440192 th'd (3/4 in. diam.)	15 1/2
Manila Cordage, 1/20769187434139310514121985316880384 th'd (3/4 in. diam.)	15 1/2
Manila Cordage, 1/41538374868278621028243970633760768 th'd (3/4 in. diam.)	15 1/2
Manila Cordage, 1/83076749736557242056487941267521536 th'd (3/4 in. diam.)	15 1/2
Manila Cordage, 1/166153499473114484112975882535042752 th'd (3/4 in. diam.)	15 1/2
Manila Cordage, 1/332306998946228968225951765070085504 th'd (3/4 in. diam.)	15 1/2
Manila Cordage, 1/664613997892457936451903530140171008 th'd (3/4 in. diam.)	15 1/2
Manila Cordage, 1/1329227995784915872903807060280342016 th'd (3/4 in. diam.)	15 1/2
Manila Cordage, 1/2658455991569831745807614120560684032 th'd (3/4 in. diam.)	15 1/2
Manila Cordage, 1/5316911983139663491615228241121368064 th'd (3/4 in. diam.)	15 1/2
Manila Cordage, 1/10633823966279326983230456482242736128 th'd (3/4 in. diam.)	15 1/2
Manila Cordage, 1/21267647932558653966460912964485472256 th'd (3/4 in. diam.)	15 1/2
Manila Cordage, 1/42535295865117307932921825928970944512 th'd (3/4 in. diam.)	15 1/2
Manila Cordage, 1/850705917302346158658436518579418880224 th'd (3/4 in. diam.)	15 1/2
Manila Cordage, 1/1701411834604692317316873037158837764448 th'd (3/4 in. diam.)	15 1/2
Manila Cordage, 1/34028236692093846346337460743176753888 th'd (3/4 in. diam.)	15 1/2
Manila Cordage, 1/68056473384187692692674921486353507776 th'd (3/4 in. diam.)	15 1/2
Manila Cordage, 1/136112946768375385385349842972707015552 th'd (3/4 in. diam.)	15 1/2
Manila Cordage, 1/272225893536750770770699685945414031104 th'd (3/4 in. diam.)	15 1/2
Manila Cordage, 1/544451787073501541541399371890828022208 th'd (3/4 in. diam.)	15 1/2
Manila Cordage, 1/1088903574147003083082798743781656044416 th'd (3/4 in. diam.)	15 1/2
Manila Cordage, 1/2177807148294006166165597487563312088832 th'd (3/4 in. diam.)	15 1/2
Manila Cordage, 1/4355614296588012332331194975126624177664 th'd (3/4 in. diam.)	15 1/2
Manila Cordage, 1/8711228593176024664662389950253248355328 th'd (3/4 in. diam.)	15 1/2
Manila Cordage, 1/1742245718635204932932477990050648670656 th'd (3/4 in. diam.)	15 1/2
Manila Cordage, 1/3484491437270409865864955980101297341312 th'd (3/4 in. diam.)	15 1/2
Manila Cordage, 1/6968982874540819731729911960202594682624 th'd (3/4 in. diam.)	15 1/2
Manila Cordage, 1/13937965749081639463459839204051893365248 th'd (3/4 in. diam.)	15 1/2
Manila Cordage, 1/27875931498163278926919678408103786726592 th'd (3/4 in. diam.)	15 1/2
Manila Cordage, 1/55751862996326557853839356816207573453184 th'd (3/4 in. diam.)	15 1/2
Manila Cordage, 1/111503725992653115707678713632415146906368 th'd (3/4 in. diam.)	15 1/2
Manila Cordage, 1/223007451985306231415357427264830293812736 th'd (3/4 in. diam.)	15 1/2
Manila Cordage, 1/44601490397061246283071485452160587665472 th'd (3/4 in. diam.)	15 1/2
Manila Cordage, 1/892029807941224925661429709104211373184448 th'd (3/4 in. diam.)	15 1/2
Manila Cordage, 1/1784059615882449851322859418208422746368896 th'd (3/4 in. diam.)	15 1/2
Manila Cordage, 1/356811923176489970264571883641684548737792 th'd (3/4 in. diam.)	15 1/2
Manila Cordage, 1/713623846352979940529143767283369097475584 th'd (3/4 in. diam.)	15 1/2
Manila Cordage, 1/1427247692705959881058287534566738194951168 th'd (3/4 in. diam.)	15 1/2
Manila Cordage, 1/2854495385411919762116575069133476389902336 th'd (3/4 in. diam.)	15 1/



Clocks.....	25	2.668
Chains and anchors.....	12	7.38
Cutlery.....	8	31.460
Guns.....	60	16.310
Hardware.....	8	4.75
Iron, pig, tons.....	1,788	35.447
Iron, sheet, tons.....	47	2.338
Iron ore, tons.....	1,205	9.545
Iron, other, tons.....	1,080	30.045
Machinery.....	212	15.068
Metal goods.....	256	21.353
Nails.....	153	1.027
Needles.....	16	6.174
Old metal.....	1	9.443
Plating.....	8	6.709
Platedware.....	3	4.64
Por. caps.....	39	4.066
Pins.....	4	6.36
Quicksilver.....	600	16.981
Saddlery.....	22	3.189
Steel.....	69,547	150,707
Silverware.....	5	107
Tin, bxs.....	22,423	106,912
Tin, 1,528 slabs, 113,596 lbs.....	22,423	2,486
Tin, 1,528 slabs, 113,596 lbs.....	22,423	1,724
Zinc oxide.....	480	4.809

The quantities of leading articles imported compare with previous dates as follows:

	For the 20 weeks week of 1883, time 1882.	Same week of 1882, time 1881.
Cutlery, pkgs.....	2,705	2,869
Hardware, pkgs.....	8	6.16
Iron, R. R. bars.....	6,324	70,841
Lead, pkgs.....	3,031	16,544
Steel, pkgs.....	69,547	773,536
Tin, bxs.....	22,423	838,164
Tin slabs, lbs.....	113,596	934,720

## EXPORTS OF SPECIE.

For the week ended May 19:	\$48,395
Previously reported.....	\$984,012

Total since January 1, 1883.....	\$5,032,407
Same time in 1882.....	\$5,746,297
Same time in 1881.....	4,656,683
Same time in 1880.....	3,472,677
Same time in 1879.....	8,215,568
Same time in 1878.....	7,501,576
Same time in 1877.....	14,707,274
Same time in 1876.....	24,190,017
Same time in 1875.....	33,474,334
Same time in 1874.....	44,099,867
Same time in 1873.....	50,304,817
Same time in 1872.....	59,474,197

## EXPORTS EXCLUSIVE OF SPECIE.

For the week ended May 23:	1881.	1882.	1883.
Total.....	\$7,077,845	\$4,942,706	\$6,373,880
Prev. reported.....	140,448,368	118,357,819	132,440,621
Since Jan. 1.....	\$147,326,213	\$123,300,525	\$138,814,510

## PHILADELPHIA.

(By Telegraph to The Iron Age.)

PHILADELPHIA, May 23, 1883.

Sales of 2000 tons Spiegeleisen have been made to-day at \$31.50, Philadelphia and Baltimore shipments.

Office of The Iron Age, 220 South Fourth St., PHILADELPHIA, May 23, 1883.

**Pig Iron.**—The market still has a very unsettled appearance, with a gradual tendency toward lower figures. The amount of business done during the week has not been large, although sellers are extremely urgent, and in many cases willing to make concessions when such a course seems likely to secure a purchaser. Nominally quotations are unchanged at from \$20 to \$21.50 at furnace for No. 1 Foundry, and \$18 to \$19 for No. 2, but business is extremely slow, and orders hard to get in lots of more than 100 to 200 or 300 tons at a time, a large proportion of the sales being still smaller quantities. The impression that prices will be lower seems to gain ground, so that consumers are buying only enough to cover immediate requirements. There is so much irregularity in prices, however, that it is difficult to quote with anything like accuracy. Some brands command \$21.50 at furnace; others are offered at \$21.50 delivered, with a certainty that bids at a still lower figure would be accepted. Prices are determined in most cases by the quantity and character of brand required, and in others on the necessity for realizing and the promptness of settlement. No. 2 Foundry iron is particularly dull, and, with heavy accumulations at furnaces, prices are more irregular and weaker in proportion than almost any other descriptions. It is reported that some of the leading companies are considering the propriety of making another cut in prices, owing to the fact that quotations recently announced are being shaded by numerous smaller concerns. It is supposed that it is the intention to crowd the weaker companies out of the market, and by that means reduce the supply, but, however that may be, it is certain that prices are being cut, and chiefly by the class above referred to. Mill irons are comparatively steady at \$18 to \$19 at furnace for standard to choice brands. The demand keeps pretty well up to the supply, so that at the moment there is not much prospect for lower prices, particularly for favorite brands. Outside lots are very irregular, however, and it is difficult to find a market at any reasonable price, although at \$17 to \$17.50 a good deal of fair iron could be bought, and from that price downward, according to the desire to realize. Price appears to have very little influence upon demand at present. If buyers need to replenish stocks, they take as little as possible, and lowering the price does not increase the order in the least. How long this will continue cannot be foretold. Some parties think that a strike in the West will lead to an increase in the local demand for Mill Irons, but in the meantime there is a disposition to await the course of events. Taking all the facts into consideration, the chances are that there will be very little change in either direction, as regards standard brands, while others may still lower before buyers can be induced to take hold.

**Bessemer Pig.**—No sales and no special urgency to buy. Sellers ask \$22, with buyers at about \$21.50.

**Spiegeleisen.**—There is some inquiry, and bids of \$31.50 have been made for 1000-ton lots of 20 ft. Sellers ask \$32, but will probably make concessions.

**Blooms.**—The market is exceedingly dull and prices very irregular. Good makes sell at about the following quotations, viz.: Charcoal Blooms, \$59.50 @ \$61; Run-out Anthracite, \$50 @ \$52.50; Scrap Blooms, \$45 @ \$46.50; Northern Ore Blooms, \$43 @ \$44.50.

**Muck Bars.**—Market quiet, but prices are steady at \$34 @ \$35, the majority of sales being at medium quotations.

**Bar Iron.**—The demand has been fairly active during the week, and the market shows a slight tendency toward steadier prices. There has been a good deal of iron

offered at about 2.1¢ @ 2.15¢, delivered, by country mills, but buyers have not taken hold with much freedom, giving the preference to city iron at 2.2¢ @ 2.25¢, particularly when quality has been of essential importance. At the monthly meeting of manufacturers, held yesterday, the opinion seemed to prevail that the position was improving, and that it was inexpedient to make any change in quotations. The card rate therefore remains at 2.3¢ as a basis for labor, and the selling price at 2.2¢ @ 2.25¢, with a reasonable probability that the market can be held at these figures during the summer months. No very large orders have been offered, but the demand for small lots appears to be sufficient to keep the mills steadily employed; hence the reaffirmation of former quotations.

**Plate and Tank Iron.**—The market has somewhat of an uneven appearance, but, on the whole, shows improvement, as compared with the past two or three weeks. There is more inquiry, and, if orders follow in proportion, the mills will be in a position to hold prices steady, even if there is no advance. Several good-sized orders are on the market, but whether they will be placed or not will probably depend a good deal on the course of events in Pittsburgh. It is too soon to assume that business is on the point of improvement, as inquiries may have been made in anticipation of a suspension of work in the Western part of the State. However that may be, the feeling is better than it has been, and although very low prices have been named in special cases, there is more firmness as a rule, and prices are steady, as follows, viz.: Bridge Plate, Tank Iron, &c., 2.4¢; Shell, 3.15¢ @ 3.25¢; Flange, 4.15¢ @ 4.25¢, and Fire-Box, 5¢ @ 5.5¢.

**Structural Iron.**—There has been a fair amount of business closed during the week, and manufacturers are feeling more hopeful than they have done for some time. Besides a fair demand for small lots, about 2000 tons bridge orders have been taken for such roads as the N. Y., L. E. and W., the C. C. and I., and others west of the Mississippi. Prices have been crowded down pretty low for Angles and Plates, but, having secured valuable orders, there is a disposition to stiffen up again, and for small lots prices are steady, as follows: Angles, 2.3¢ @ 2.4¢; Tees, 3.2¢, and Beams and Channels, 3.5¢.

**Sheet Iron.**—The demand has shown considerable improvement, and quite a number of good sized orders have been placed. Many of the large dealers have made contracts for summer and fall delivery, and although prices have not been altogether satisfactory to manufacturers, there is a general impression that bottom has been reached, and gradual improvement is hoped for as the season advances. Small lots may be quoted as follows:

Common Sheets, No. 28.....	4.5¢
Common Sheets, Nos. 26 and 27.....	4.5¢
Common Sheets, No. 21 to 25.....	4.5¢
Common Sheets, No. 18 to 20.....	4.5¢
Best Refined, 1/2¢ advance on the above.....	4.5¢
Best Bloom Sheets, No. 26 to 28.....	6.5¢
Best Bloom Sheets, No. 22 to 25.....	6.5¢
Common Red Plates, 3/16 to 1/8.....	6.5¢
Best Bloom, Galvanized, discount.....	4.5¢
Second quality, discount.....	50¢

**Wrought Iron Pipe.**—The demand has not been quite up to that of last week, but prices are continued as before, say 57 1/2¢ @ 60¢ discount on Boiler Tubes, and 70¢ for Gas and Steam Pipes, with extra discounts on special sizes.

**Steel Rails.**—There is more inquiry for Rails, one or two being for lots of 10,000 tons each, but the amount of business closed has not been very large. The demand is for summer delivery, and as the mills are already pretty well filled up with work, they are indifferent about entering more at the low prices at which buyers expect to place their orders. Concessions could be had for winter work, but there is very little demand other than for deliveries inside of four to six months. Sales have been made on the basis of \$38 @ \$39 at mill for Heavy Rails, with the usual advance on Light Sections.

**Old Rails.**—Small lots, spot delivery, would command \$23.50 @ \$24, but for July there are sellers at \$1 less, with \$21.50 as about the best offer that can be had. The market is weak, with a probability that concessions will have to be made before buyers can be induced to take hold.

**Scrap Iron.**—Market extremely dull at \$23 @ \$23.50 for Foreign, and \$25 @ \$26 for Choice Selected.

**Nails.**—Are in active request, and we hear of several inquiries for large lots, but there appears to be little disposition to book such orders, unless for prompt shipment, as the market at the moment is somewhat uncertain, owing to the labor trouble West. The feeling may be said to be somewhat firmer. We quote \$3.15 per keg in ordinary lots.

## PITTSBURGH.

(By Telegraph to The Iron Age.)

PITTSBURGH, May 23, 1883.

Seventeen hundred tons of Marshall Pig Iron were sold at auction yesterday. Bidding was lively, but the prices realized were below market rates. Eighty-four tons Wheeling No. 1 sold at \$17.25; 83 tons Cleveland Gray Forge and Inferior Iron, at \$14; 91 tons Isabella No. 2, at \$17.25; 245 tons Lemont No. 1, in two lots, at \$16 and \$16.25; 300 tons Bowery No. 1, at \$18.50; 148 tons Oliphant Gray Forge at \$16.50; 75 tons Lemont Gray Forge, in two lots, at \$16 and \$16.12 1/2; 136 tons Marshall Brothers' Gray Forge, at \$17.12 1/2. These prices are \$1 @ \$2 below the market rates.

The ironworkers have presented the scale to a number of the manufacturers for signature, but so far it has been refused by all iron manufacturers. Some steel works have signed it.

A number of the operators in the railroad mines in the neighborhood of Pittsburgh have refused to be parties to the arbitration, declaring that they cannot afford to mine at over 3¢, and will not.

Office of The Iron Age, 77 Fourth Avenue, PITTSBURGH, May 23, 1883.

That there will be a lockout next month, for a longer or shorter period, seems almost certain. Both the mill owners and the ironworkers have placed themselves in such

a position that there is scarcely a chance for a compromise, although it is still possible. It is suggested, as a way out of the present dilemma, that the mill owners renew the present scale and then shut down for a couple of months, or longer if deemed necessary; but it is certain they will not do this—they want a reduction in the price of labor and will be satisfied with nothing less. It is worthy of note that there are several iron mills having non-union workers. Whether the non-union men will submit to a reduction or not remains to be seen. If they do and there is a lockout, it will give the non-union a decided advantage over the union mills, and it would afford a strong temptation for some of the latter to fall into the non-union ranks.

**Ore.**—The Ore market continues exceedingly dull, with but little prospect of any immediate change for the better. As Pig Iron furnaces are still blowing out, the consumption of Ore is steadily decreasing, and the Ore companies will have to follow the example of the furnaces and cut down production. The receipts of Lake Ore here have almost entirely ceased.

**Pig Iron.**—There has been very little change in the situation since our last report. Business continues dull, demand is of a hand-to-mouth character, and prices weak and irregular. Mill owners, in view of a probable lockout the first of next month, are buying very sparingly, and sellers, realizing that it is useless to do so, are making very little effort to sell. There is to be a sale of 1500 tons of the Marshall Iron this afternoon at public auction, but at too late an hour to give the result in this report. This sale is regarded with a good deal of interest in iron circles, as the prices realized will to some extent fix a market value for the rest of this Iron—some 55,000 to 58,000 tons. Prices are nominally the same as a week ago:

No. 1 Foundry.....	\$21.00 @ 22.00, 4 mos.
No. 2.....	19.00 @ 20.00, 4 "
Neutral Gray Forge.....	18.00 @ 18.50, 4 "
Bessemer.....	21.00 @ 22.00, 4 "
Cold-Blast Charcoal.....	20.00 @ 21.00, 4 "

The regular monthly meeting of the Western Pig Iron Association took place last Wednesday, but there was nothing important developed excepting that stocks were reported smaller.

**Muck Bar.**—In the absence of sales we continue to quote, nominally, at \$34 @ \$35, 4 mos. There does not appear to be much inquiry, and so far as we can learn, very little offering.

**Manufactured Iron.**—The fear of a lockout has, as might be expected, stimulated the demand. Some mills, having all the orders booked they can execute, are declining new ones, and all are refusing to sell for delivery beyond this month. The increased demand may be attributed almost wholly to apprehensions of a stoppage of the mills next month, so that in reality there has been no real improvement in the situation. There are those who think that, lockout or no lockout, the mills should stop for a couple of months. Prices are still quoted on a basis of 2¢ @ 2.1¢ for Bars for assorted orders.

**Nails.**—There is a continued good demand; manufacturers have all they can do, and some of them are refusing to take additional orders. Large jobbers have been on the anxious bench for some time past; they were afraid to buy largely lest there should not be a lockout, and not to buy lest there should be; hence, as a rule, they have small stocks, and the supply in first hands is reported very tight both here and at Wheeling. We are reliably informed that Wheeling has been wanting to buy Nails here within the past week or two, which is strong evidence that there is no stock there. Manufacturers are refusing to make any contracts for delivery beyond this month, unless with a proviso that in the event of a lockout they must not be expected to deliver. Prices are firm, but unchanged, at \$3 @ \$3.10, 60 days, 2¢ off for cash—no abatement on these prices for carload lots or upward. Indeed, in the present condition of affairs it would be difficult to place a large order.

**Wrought Iron Pipe.**—As in the case of all other kinds of Finished Iron, the prospect of a lockout has stimulated business considerably, and prices are firmer, but without quotable change, as compared with those of a week ago. If jobbers and consumers could only satisfy themselves fully that there would be a lockout, they would buy much more freely. We quote discounts on Gas and Steam Pipe at 70 and 5¢ @ 70 and 10¢, and on Boiler Tubes at 55 and 5¢. Oil-Well Casing quoted at 45¢ @ 50¢ per foot, net; do. Tubing, 15¢ @ 16¢.

**Steel.**—The Merchant Steel trade continues dull and unsatisfactory, and, what is still worse, there is not much prospect of any immediate improvement. But few, if any, of the mills are working up to anything like their full capacity. The fact of the matter is that trade has been dull since last fall, and, as in the case of Iron, there is an overproduction; indeed, the Steel-making capacity has been increased more during the past year or two than that of Iron. Prices are weak and irregular, particularly as regards the lower grades of Steel.

**Steel Rails.**—There is nothing new to record; mills here still have all they can do, and prices, if anything, are firmer, but unchanged. We continue to quote at \$39 @ \$40, cash, at mill, for Heavy Sections.

**Old Rails.**—There was a sale a few days ago of 500 tons of American Tees at \$22.50, and since then rumors of sales at \$22, showing a decline of \$3.50 @ \$4 per ton within the past 30 or 40 days. Your correspondent as yet has not been able to confirm the rumor, arriving from New York, of a sale of 5000 tons at \$22, delivered in Pittsburgh. The sale is large, but the price is not out of the way.

**Railway Track Supplies.**—Spikes have been advanced to 2.60¢, 30 days, with a fair business. Splice Bars are still quoted at 2¢ @ 2.1¢; and Track Bolts at 3.25¢ with Square and 3.35¢ @ 3.4¢ with Hexagon Nuts. Everything in this line is firmer in price, in sympathy with Finished Iron.

**Scrap.**—The Scrap market continues very dull, and there is so little doing that it is difficult to give reliable quotations. No. 1 Wrought is quoted at \$22 @ \$23 (net ton) for Ordinary, and \$24 @ \$25 for Selected Railway; Wrought Turnings, \$16 @ 18; Old Car Axles, \$33 @ 35; Steel Rail Ends, \$25 (gross

ton); Old Car Wheels, \$21.50 @ \$22.50, gross; Cast Borings, \$13 @ \$14. Dealers all say that it is impossible to give accurate quotations in the present condition of affairs.

**Coke.**—This important interest continues in a very dull and depressed condition, and no improvement need be looked for until there is a revival in the Iron business. With so many Pig-Iron furnaces going out of blast, the consumption of Coke has been very much reduced, and prices are weak and dropping in consequence. We now quote at 90¢ @ 95¢ per ton, free on cars at ovens.

**Window Glass.**—Business continues slow for the season and unsatisfactory, but an improved demand is looked for within the next few weeks. Prices are still quoted at 70 and 5¢ discount on Single and 75¢ on Double Strength, in carload lots and upward.

## CHICAGO.

Office of The Iron Age, 36 and 38 Clark St., cor. Lake, CHICAGO, May 21, 1883.

**Hardware.**—We have no particular change to note in the market for Shelf and Heavy Hardware, with the exception of a slight improvement in the demand over that of the previous week.

We have received from the Chicago Hardware Mfg. Co., 29 to 39 Erie street, manufacturers of the Niles Patent Door Knobs and Locks, Champion Spring Hinges and other specialties, an illustrated catalogue of 124 pages, with new price lists and discounts to the trade. They give notice that they will be able to fill orders promptly for Anti-Friction Locks and Three-bolt Locks after July 1st, and Butts after August 20th.

We have received from Champlin & Spencer, Nos. 152 and 154 Lake street, circular and price list of the Acme Adjustable Countersink manufactured by them, in which they say:

"This tool is well made in every part; the best of material is used in its construction; it is simple and yet practical. It has only three parts—two knives and the body for holding the same—consequently not liable to get out of order; all the bodies are handsomely nickel-plated, and, with care used in making, together with good material, gives you a tool which you cannot well afford to be without. The knives (which are made of steel) can be adjusted for the smallest to the largest screw which will require countersinking, and will do the work quicker and better than any countersink on the market. It is just the tool wanted by all wood-working people where nice work wants to be done. Packed one dozen in a box. Price per dozen, \$6; sample by mail, post-paid, 50 cents; discount, 25%."

**Nails.**—A very active demand exists for rod, to 60d. sizes, and jobbers state that stocks on hand are fair, while the quotation remains unchanged, but with an upward tendency. We quote \$3.15 per keg for carload lots and \$3.25 for smaller lots.

**Manufactured Iron.**—A firmer feeling prevails in this market than at our last writing, while quotations as yet remain unchanged. We quote Bars, 2.20¢ @ 2.3¢ rates; Angle Iron, 3¢ @ 3.20¢ rates; T Iron, 4¢ rates; Beams, 3.80¢; Channels, 3¢; Tank Iron, 2.80¢ @ 3¢ rates; Sheet Iron, 3¢ @ 3.20¢ rates; Norway Original Bars, 4 1/2¢ rates; Norway Re-rolled Bars, 5 1/2¢ rates; Ulster, 4 1/2¢ rates; Low Moor Iron, 8¢ rates; Nuts and Washers, 8¢ off list; Wrought Boat Spikes, 3¢ rates.

**Pig Iron.**—No change has taken place in the market since our previous report. We quote as follows: Lake Superior, Nos. 1 and 2, \$23.50; No. 3, \$24, and Nos. 4, 5 and 6, \$25, 4 mos.; Briar Hill, \$25; Silvery Soft, \$23 @ \$24; Crane No. 1, \$27.50; No. 2, \$26.50; Himrod, \$23; Thomas, \$24 @ \$26; American Scotch, \$24 @ \$25; Du Val, No. 1, \$24; No. 2, \$21.50; Fulton Notch, No. 2, \$22.50; No. 3, \$21.50; Calumet, \$23 @ \$23.50, 4 mos.; Scotch Imported, \$31; and Southern Coke, No. 1, \$23.85; No. 2, \$22.55; Imported Scotch for future delivery, \$27 @ \$28.50 per ton.

**Steel.**—The market is slightly improved in tone, as is also the demand, while prices remain unchanged. We quote as follows: Tool, 11 1/2¢; Machinery O. H., 5¢; Crucible Machinery, 7¢; Hammer, 2 inches and under, 8¢; over 2 inches, 9¢; Cast Spring, 6¢, and O. H. Spring, Tire and Sleigh Shoe, 5¢; Sheet, first, second and third quality, 12¢, 10 1/2¢ and 8 1/2¢ respectively; Crucible Plow, 6¢; Eagle Plow, 5¢; Iron Center Plow, 9 1/2¢, and Soft Steel Center Plow, 9 1/2¢; Cast Plow, 5¢; German Plow, 4 1/2¢.

**Scrap Iron.**—As for some time past, the market continues dull and weak. We quote as follows, which are dealers' purchasing prices: No. 1 Railroad Wrought Scrap, per net ton, \$21; No. 1 Country Wrought Scrap, per net ton, \$18; No. 1 Cast Scrap, per ton, \$16; No. 1 Stove Plate Scrap, per ton, \$10; Machine Shop Wrought Turnings, per ton, \$9; Cast Iron Borings, \$7; Old Plows and Plow Steel, \$12; Malleable Scrap, \$5.

## CHATTANOOGA.

Office of The Iron Age, Market and 8th Sts., CHATTANOOGA, May 21, 1883.

Southern trade is fair. Merchants report about an average business, and collections about as prompt as usual. Failures are rare, and what occur are small affairs. The building business in Southern towns and cities promises even larger results than last year, phenomenal as that was. All kinds of materials used by house-builders command high prices, and first-rate articles are not readily found. The weather for the week has been dry and warm.

**Pig Iron.**—The tendency is to dullness and lower prices. The weaker holders are generally unloading at such rates as they can get. We learn of no serious embarrassments, though some of the larger plants are piling iron in considerable quantities. We hear of sales of lowest grades of White and Mottled as low as \$13 @ \$14, but such terms could not be had of any company making standard brands. Some of the best furnaces have considerable contracts running over from last year, the filling of which keeps their banks clear. To place large lots outside figures would have to be shaded about

\$1 per ton. We quote: No. 1 Foundry, \$19 @ \$20; No. 2 Foundry, \$17 @ \$18; Gray Forge, \$16 @ \$17; White and Mottled, \$15 @ \$16.

**Ores.**—We quote: 50¢ Brown Hematite, per ton, \$2 @ \$2.75; Red Fossil, \$1.75 @ \$2, delivered at furnace.

**Miscellaneous Articles.**—The supply of Old Rails is ample at \$23. Wrought Scrap, \$18 @ \$20; Cast Scrap, \$11 @ \$12; Old Wheels, \$23.

**Nails.**—Are fairly strong at \$3. A Southern factor of Northern makers has advised that the Western mills are generally full up with orders covering their capacity for June, and they decline transient contracts. We quote at \$3.10 in a jobbing way. The Nail trade is one item of the market that shows some life.

**Manufactured Iron.**—We quote assorted Bars, carload lots, \$23; Railroad Spikes, \$3; Track Bolts, \$3.30; Fish Plate, \$2.

**Coal.**—We quote: Fancy Lump, \$3; Common, \$2 @ \$2.50; run of mine to manufacturers, \$1.75.

**Coke.**—We quote: Furnace Coke, \$3 at point of consumption; Foundry, 10¢ @ 13¢ per bushel.

## CINCINNATI.

MAY 21, 1883.—**Pig Iron.**—No change to note in the market; the amount of business and prices remain about as before. Forge grades are totally neglected; the mills are using up their stocks, anticipating a shut-down on account of the unsettled condition of the labor question. Quotations: Best No. 1 H. R. C. Foundry, \$25 @ \$25.50; Good, \$24.50 @ \$25; Southern, \$21.50 @ \$22.50; H. R. Coke, No. 1, \$22.50; Southern, \$20.50 @ \$21; No. 2 of above kinds, 50¢ @ \$1 less. American Scotch, \$21 @ \$21.50; Silver Gray Softeners, \$20.50 for No. 1; \$19.50 @ \$20 for No. 2; \$19, No. 3; Machinery Coke and Stone-coal, \$20 @ \$19; Forge, \$17.50 @ \$22.50 for grades Stone-coal Coke and C. C.; Car Wheel, Cold Blast C. C., \$25 @ \$30; Warm Blast, \$23 @ \$27; Scrap Iron, Wrought, 1¢ @ 1.25¢; Cast, 50¢ @ 80¢; Wheels, 1¢; Old Rails, 1¢. The feeling among both producers and consumers of Pig Iron is reported to be that no material changes in prices will obtain within two or three months.

## LOUISVILLE.

GEO. H. HULL & Co., Commission Merchants, report to us as follows, under date of May 19, 1883: The market is very irregular. Accurate quotations cannot be given. Some sales are reported at extremely low figures. Furnaces generally are very firm and waiting for the market to settle. We quote, for cash, in round lots, as below:

## POUNDRY IRON.

No. 1 Hanging Rock Charcoal.....	\$25.00 @ 26.00
No. 1 Southern Charcoal.....	25.00 @ 26.00
No. 1 Hanging Rock Stone-coal and Coke.....	20.00 @ 21.50
No. 1 Southern Stone-coal and Coke.....	20.00 @ 20.50
No. 2 Southern Stone-coal and Coke.....	19.00 @ 20.00
American Scotch.....	19.00 @ 20.00
Open Silver-gray.....	19.00 @ 20.00
Close Silver-gray.....	18.00 @ 19.50

## MILL IRONS.

No. 1 Charcoal.....	20.00 @ 21.00
No. 1 Stonecoal and Coke, Neutral.....	21.50 @ 22.50
No. 2 Stonecoal and Coke, Neutral.....	19.00 @ 20.50
No. 1 Stonecoal and Coke, Cold-short.....	18.00 @ 18.50
No. 2 Stonecoal and Coke, Cold short.....	18.00 @ 18.50
White and Mottled, Cold-short and Neutral.....	16.50 @ 17.50



Ref. Bar Iron, 1 to 6 x 3/4 to 1, 1/2	2 1/2 @ 2.35
" " 1 to 4 1/2 x 1 1/2 to 1, 1/2	2 1/2 @ 2.35
and Square	2 1/2 @ 2.35
Hoop Iron, 1 1/2 wide and upward	2 1/2 @ 2.35
Band Iron, from 1 1/2 to 5 in. wide	2 1/2 @ 2.35
Norway Nail Rods	3 1/2 @ 3.50
Black Diamond Cast Steel	11 @ 12
Machinery Steel	4 1/2 @ 5
Spring Steel	4 @ 4 1/2
Common Horse Nails	10 @ 11
Railroad Spikes, 3 1/4 x 9 1/2	2 @ 10
Perkins' Horse Shoes, 1/2 keg of 100	1 1/2 @ 3 1/2
Mule Shoes	5 @ 3 1/2

## RICHMOND.

ASA SYDNER, Iron Merchant and Furnace Agent, writes as follows, under date of May 21, 1883: This market is not consuming as much Pig and Manufactured Iron as the early spring indications promised. The quotations below would be reduced for large orders:

No. 1 Scotch Pig Iron	24.00 @ 26.50
No. 1 Anthracite Pig Iron	23.75 @ 25.75
No. 2 " "	21.75 @ 23.50
No. 1 Virginia Coke Pig Iron	21.75 @ 23.25
No. 2 " "	20.75 @ 21.75
No. 3 " "	19.25 @ 21.25
White and Mottled	17.75 @ 19.75
Virginia C. B. Charcoal	27.00 @ 29.00
Old Dom. Nails (carload lots)	3.00 @
Old Rails	22.00 @ 23.00
Old Wheels	19.00 @ 20.00
Wrought Scrap, No. 1	25.00 @ 26.00
Cast Scrap, No. 1	18.00 @ 19.00
Richmond Refined Bar Iron	2 @ 10
Horse Shoes (Tredegar)	4 @ 50
Mule	5 @ 50

## Our English Letter.

## Review of the British Iron, Steel, Metal and Hardware Trades.

(From Our Regular Correspondent.)

LONDON, ENG., May 7, 1883.

## THE SITUATION

is very much the same as when I last wrote on your behalf. In the open markets there is scarcely any life and the spirit of speculation seems to be dead. Money is forthcoming in abundance for any enterprise which is seen to be worthy of support, but investors fight shy of venturesome undertakings, whether floated on the Stock Exchange or put forth in other directions. Loans can be obtained by the corporations of towns and by public bodies generally at 4 per cent., and the 3 per cent. Consols (Government stocks) stand at 102 per £100. Under such circumstances it is not a little curious that speculation should be so entirely wanting in general matters. As a rule, it has been noticed that when money is abundant and the rate of interest proportionately low, there is a decided tendency for moneyed persons to "try the lucky bag" of speculation. The prime conditions obtain just now, but the sequence is wanting—for what reason I do not profess to be able to state. Much wiser persons than your humble servant are equally nonplussed by the situation. Some of them are disposed to think that what Mr. Goschen styles "the appreciation of gold" may have something to do with it. Mr. Goschen points that the production of gold has been greatly on the decrease during the past two years, while at the same time vast amounts of the metal have been absorbed by Germany and other nations for circulation purposes. He concludes, therefore, that the purchasing power of a given gold coin—say a sovereign, a napoleon, a 20-mark piece and an eagle—is now appreciably greater than it was prior to the period of which he speaks, say 10 or 12 years ago. The problem is confessedly an intricate and difficult one, yet if gold to the value of £200,000,000 (say \$1,000,000,000) has been absorbed in supplying the United States, Germany and Italy with their new gold coinage, while concurrently the annual yield of the world's gold mines has fallen from £30,000,000 in 1851 to below £20,000,000 now, the idea of Mr. Goschen is feasible. Especially is this likely to be the case when it is remembered that the requirements of our circulation—the work it has to perform—have at the same time been growing with remarkable rapidity. The net outcome is that prices have fallen, and the standard of values has been lowered in almost all kinds of products and commodities. His view is in substantial accord with what I have on more than one occasion urged as being a certainty in connection with iron, steel and metals generally. For various reasons we have progressed so rapidly that no reliable comparison can be instituted between the values of to-day and of a few years ago. Looked at from this standpoint, it follows that iron at, say, \$35 to-day is as valuable and as profitable as when it stood at \$40 a few years back. There may, and must be, exceptions to this rule, but for the purposes of argument and illustration I think it may be assumed that although almost all kinds of goods have gradually declined in their nominal prices, yet the world is no poorer by reason of such declination, but is the richer rather than the contrary. It would seem to follow, therefore, that unless there should be new discoveries of gold we may look for a continued low range of values—occasionally varied, perhaps, by abnormal occurrences, but, on the whole, a much lower limit than that of the last two decades.

## THE IRON MARKET

is dull in all directions, with scarcely any variations in prices worthy of special note. Crude irons are almost stationary and have a slow demand, although there is a good deal of iron being delivered on running contracts. At Glasgow warrants are a little better under the influence of buying by certain of the brokers to cover their earlier bargains. The public still refrain from touching warrants; consequently the brokers are not doing big things. Scotch brands of pig iron are nominally about the same, but they are to be had at lower prices, particularly the brands most affected by the renewed competition of Middleboro' pig iron, which is being sent into Scotland much more freely now than for a long time past. At Middleboro' prices are unchanged on the basis of 40/ @ 40 3/4 for No. 3, but it is believed that the re-ports of transactions at 39/6 @ 39/9 are well founded. The ironmasters' returns for April show that the shipments during that month were much larger, and that the reserved

stocks decreased to an considerable extent, yet neither circumstance has had any appreciable effect upon prices. In the same way the resolution of the West Coast smelters to considerably restrict the output of hematite pigs has not in any respect stimulated the market or hardened values. Consumers evidently have not the slightest fear of the occurrence of events unfavorable to them, but rather anticipate that they may await developments with the utmost confidence. The observation holds good in respect of all the other iron-making districts, and as regards almost all grades of crude and finished iron. The prevalent policy is one of buying no more than is necessary for the wants of the time being, leaving the future to take care of itself. Ordinary sorts of finished iron are exactly as of late in point of open quotations, but it is unquestionable that underselling is in vogue in all directions. Buyers with cash, and orders of respectable proportions, may almost command their own terms for other than the best brands. Market bars still stand at £7. 10/., but excellent unmarked iron is to be had at £7 @ £6, and ordinary assortments of Welsh bars are on sale at £5. 7/6 per ton. Other classes of iron are equally variable, and it is virtually impossible at the moment to mention a price (above £5. 10/.) which will not buy any class of iron—of a sort. Merchants and other buyers are naturally well content with this state of things, and in not a few instances are placing orders rather freely at absolute bottom rates. It is understood that there are still sundry American inquiries in the market for different kinds of iron, but I am unable to gather that orders of any size have actually been placed.

The news, just received here by cable, that your ironworkers intend to fight out the wages question, is regarded as being a serious matter. We are told that the Pittsburgh ironmasters have refused to book orders for deliveries after May 1, and that 100,000 ironworkers are coming out on strike in opposition to the reduction of wages proposed by their employers. In the absence of more definite information, it is impossible, of course, to infer the probable effects of the dispute, but in some rather sanguine minds here it is held that the broad result of the *lapse* will be to send over many orders to this country. Less eager persons admit this possibility, but wisely suggest that it is by no means certain that a single additional order will come here under the circumstances. In any case, further news will be awaited with much impatience, for the cessation from labor of 100,000 ironworkers in any part of the world must needs be an event of grave importance to the similar industries of this country. In iron rails there is no movement, and prices are purely nominal at £5 and upward per ton. Old rails are inquired after, but are relatively scarce, and are steadily held by the railways. For old D. H. the running quotations are 68/ @ 70/ per ton, f.o.b. for net cash, with about 75/ offered by your buyers, c.i.f. New York. Heavy wrought scrap is neglected, at about 57/6 @ 60/ f.o.b. London or outports. Old scrap leaf spring steel is called 87/6 @ 90/ per ton, and is in fair request. In Bessemer blooms very little indeed is being done. Steel rails are dull and flat, at £4. 15/ upward for ordinary heavy flange sections, but I think American buyers could get suited at \$40, c.i.f. United States ports, July and late deliveries. The mills are all moderately engaged, but there is no pressure. Wages are being reduced by all the leading steel-rail concerns. For crop ends 61/ @ 62/ are being paid for early shipments from Wales, &c., and makers are firm in their views, with only light stocks on hand.

THE IRON AND STEEL INSTITUTE MEETING, which will commence a couple of days hence, will not be productive of anything sensational in the way of metallurgical literature. The new president, Mr. B. Samuelson, M. P., will deliver an interesting address, and the Bessemer medals for the year will be awarded to Mr. S. G. Thomas and Mr. G. J. Snelus. It is to be regretted that Mr. Thomas is not in a better state of health to enjoy the honor so deservedly bestowed upon him. Perhaps the best paper is that of Mr. Lowthian Bell, on the effect of high temperatures. The attendance is scarcely likely to be up to our average.

## SCOTCH PIG IRON

is quiet and weak, although a spurt sent up warrants a few pence per ton last week. As a matter of fact, warrants, on May 4, were 1d. @ 2d. per ton higher than on the same date in 1882. Maker's brands are becoming irregularly weaker, and are not likely to recuperate so long as Middleboro' pig is so largely imported. At present there are 114 furnaces in blast in Scotland (including eight on hematite), as against 113 this date last year, while in Connal's Glasgow stores there are 581,693 tons, against 534,094 tons same date 1882. The decrease in the stores last week was 482 tons only, and it is anticipated that the next few weeks will once more witness weekly additions. Shipments to date are 11,075 tons below those of 1882, while the decrease in the quantity of Middleboro' pig imported into Scotland is 355 tons only, owing to the large increases in the traffic within the past few weeks. Writing from Glasgow on May 5, James Watson Co. said: "The Scotch pig-iron market has been firmer this week, at an advance of 6d. per ton in price of warrants, owing to speculative purchases on the part of those connected with the trade. The shipping demand is very quiet and prices of special brands show no improvement. The Middleboro' market is dull, although shipments continue large. On Monday last the warrant market advanced from 47/ to 47 1/4 per ton, and on Tuesday a good business was done between 47 1/4 and 47 1/2 cash. On Wednesday the market was unchanged, with transactions between 47 1/4 and 47 1/2, while yesterday the price improved to 47 1/2; to-day a large business was transacted between 47 1/2, 47 1/4 and 47 1/2, closing with buyers at the best. The shipments last week were 11,179 tons, as compared with 15,056 tons for the corresponding week of last year." We quote:

	No. 1.	No. 2.
G. M. B., at Glasgow	48/6	46/6
Clyde, " "	48/6	46/6
Cuthbert, " "	48/6	46/6
Langloan, " "	48/6	46/6
Gartshore, " "	48/6	46/6
Summerlee, " "	48/6	46/6
Caldar, " "	48/6	46/6
Carubroe, " "	48/6	46/6

Glengarnock, at Ardrossan	54/6	48/6
Eglinton, " "	48/6	48/6
Dalmellington, " "	48/6	48/6
Shots, at Leith	53/	36/
Kinnell, at Bonness	48/	47/
Carron, at Grangemouth	50/6	48/6

## MIDDLEBORO' PIG IRON

remains lifeless, with much larger shipments and a well-sustained local consumption, but with no improvement whatever in selling values—indeed (as I have already mentioned), No. 3 is reported to have changed hands at 39/6 @ 39/9, although the nominal price is 40/ @ 40/3 per ton. For G. M. B., f.o.b. at makers' wharves in Tees, net cash, less 2 1/2, figures are:

No. 1 Foundry	44/3	Mottled	38/9
" " "	42/3	White	38/3
" " "	40/3	Refined Metal	56/6
" " "	39/3	Kentledge	41/6
" " "	39/3	Cinder	35/

I give "Redcar" prices lower down. The whole of the finished iron workers have now agreed to comply with the arrangements made for restricting the make by one turn per fortnight.

## CLEVELAND IRONMASTERS' RETURNS for the month of April are as follows:

MAKE OF PIG IRON.	1883.	1882.	Increase.	Decrease.
	April.	March.	Tons.	Tons.
Cleveland pig, port of Middleborough	124,110	128,246	4,137	
Cleveland pig, outside	27,915	29,583	1,668	
Cleveland pig, whole district	152,025	157,829	5,804	
Other kinds, including hematite, spiegel and basic pig iron, whole district	77,182	78,266	1,084	
Total of all kinds, whole district	229,207	236,095	6,888	
Furnaces on Cleveland pig iron at end of month, whole district	83	85	2	
Furnaces on hematite, &c., at end of month, whole district	37	35	2	
Total	120	120		

STOCKS OF PIG IRON.	1883.	1882.	Increase.	Decrease.
	April 30.	March 31.	Tons.	Tons.
Makers' stocks of Cleveland pig, port of Middleborough	135,807	165,166	29,359	
Makers' stocks of Cleveland pig, outside of Middleborough	24,840	37,545	12,705	
Makers' stocks of Cleveland pig, whole district	160,647	202,711	42,064	
Makers' stocks of Cleveland pig, whole district, in public stores	16,833	21,015	4,182	
The N. E. R. Co.'s stores	4,685	6,645	1,960	
Connal's stores	19,414	81,870	62,456	
Total	200,946	307,941	106,995	

## SHIPMENTS OF PIG IRON FROM PORT OF MIDDLEBORO'.

	1883.	1882.	Increase.	Decrease.
	April.	March.	April.	March.
Shipments for	51,349	40,538	10,811	12,615
Shipments coastwise	36,701	34,763	1,938	6,350
Total	88,050	75,301	12,749	18,965

\* Including 914 tons of pig iron other than "Cleveland."  
† Including 1257 tons of pig iron other than "Cleveland."

## WEST COAST HEMATITES

are without special features to note, save that the furnacemen threaten a strike against the proposed reduction of their wages. It is thought, however, that they will not prove obdurate in the face of the palpably dull state of the business. Mixed lots in usual proportions are now quoted 51/ @ 51/6, and makers' own brands are:

	No. 1.	No. 2.	No. 3.
Cleator	56/	55/6	55/
Lonsdale	56/	55/6	55/
Workington	56/	55/6	55/
West Cumberland	56/	55/6	55/
Lowther	56/	55/6	55/
Moss Bay	56/	55/6	55/
Distington	56/	55/6	55/
Harrington	56/	55/6	55/
Solway	56/	55/6	55/
Marport	56/	55/6	55/

There are 58 (of 82) furnaces at work. Last week's shipments included 12,353 tons of pig iron and 9975 tons of steel rails.

## STATISTICS OF METALS.

The subjoined particulars of stocks, &c., of the leading metals on May 1, will doubt, less be of interest to many of your readers. Here we are threatened with an avalanche of Arizona and Montana copper, to say nothing of Lake Superior.

Copper in Lake Superior: Stocks in Europe: Liverpool and Swansea, Chili bars, 24,494; Chili ingots, 427; Chili ores and regulus, fine, 1955; other furnace stuff, fine, 1237; London, foreign copper (chiefly Australian) and landing, 4397; France, Chili bars, ingots and Barilla, 2380; other copper, 140. Afloat and chartered from Chili to Europe: Advised by mail, ores and regulus, fine, 1642; bars and ingots, 4051; advised by cable, ores and regulus, fine, 100; bars and ingots, 4100. Afloat from Australia to Europe: Advised by mail, fine copper, 71; advised by cable, do., 1957. These figures show the total visible supply on April 30 to have been 49,961 tons, as against 48,535 tons on March 31, and 51,015 tons on April 30 last year. The charters from Chili for the month ending April 15, the imports of furnace stuff other than Chilean, shipments from Australia, and imports of Barilla, Lake and sundries, made the total supply in England and France last month 8507 tons, in comparison with 7275 tons during March, and 4231 tons in April, 1882. The deliveries in England and France last month amounted to 7081 tons, as against 5582 tons the

previous month, and 6246 tons in April last year.

Tin in tons.—Straits and Australian, spot, 5178; ditto, landing, 943; Straits, afloat, 1285; Australian, afloat, 1398; Banca, on warrants, 1010; Billiton, spot, 2102; ditto, afloat, 1309; Australian in Holland, 7; and stocks in America, including quantity afloat, 3180, making the total visible supply on the last day of April, 16,417 tons, as compared with 17,360 tons on March 31, and 16,213 tons on April 30 last year. The deliveries during the month were: In London, 1360, and in Holland, 753, or a total of 2113, against 1839 during March, and 2053 in April, 1882. The shipments during April were: From Straits to London, 525; Australia to London, 500; London and Holland to America, 150; Straits to America, 325, and Australia to America, 50. The shipments during the 12 months ending April 30 have been: From Straits to London (1883), 6028; (1882), 5314; from Australia to London (1883), 8488; (1882), 8964; from Straits to America (1883), 6192; (1882), 7370; from Australia to America (1883), 1891; (1882), 1134. The deliveries during the same period have been: In London (1883), 15,718; (1882), 15,495; in London and Holland (1883), 22,190; (1882), 23,496; in London, Holland and the United States (1883), 32,290; (1882), 32,696. The Banca in the Dutch Trading Co.'s hands and afloat on April 30 was 3680 tons.

Spelter.—The stocks of spelter on the 1st of the month were: In London, 136 tons; Hull, 3187 tons, and Grimsby, 24 tons, making a total of 3347 tons, as compared with 3725 tons on April 1, and 3273 tons on May 1, 1882.

Lead is very dull and likely to remain so. Tin plates are unchanged and quiet at 15/ @ 16/3 for B. V. cokes, and wasters, 14/ @ 14/6 in Liverpool.

## FOREIGN.

## FRANCE.

(Moniteur des Interests Materiels.)  
PARIS, May 6, 1883.—Metals.—Nothing has occurred to modify the general situation; business in general develops normally. So far as can be judged at this early stage, the French coal crop will be an average one, but the demand for Metals is still quite slack and the tendency still downward, so that for the week we have again to put on record a general decline in prices. Copper.—We quote at the close: Chili Bars, 160 @ 153.75; Ingots and Slabs, 167.50; Best Selected, 172.50, and pure Corocoro Ore, 165. Tin.—Banca, 260; Billiton, 255; Straits and Australian, 252.50, and English, 252.50. Lead, 28.25 @ 33, and Spelter, 30.25 @ 35. Iron.—A languishing state of affairs has prevailed during the week; some business was done, but not enough to give tone to the market. The Northern rolling mills intend creating an entrepot of their own in this city and keeping up a regular supply of their products, a thing which has made, as may be supposed, a bad impression among dealers, causing a drop in Merchant Iron to 18 francs per 100 kg. In the Longwy district it is found that stocks are still excessive; hence two more blast furnaces are to be blown out. They quote at present, Puddling Pig, 6.71 @ 6.80, and Foundry 6.00 @ 7 francs per 100 kg. At St. Dizier the Southern Railroad Co. has ordered 90 locomotives from the River-Lille district, the corresponding order will be made in Alsace-Lorraine. On April 23 the first Bessemer Steel was made at the St. Nazaire Steel Works. The Government has made its first arrangement with the Paris-Lyon-Mediterranean Railway Co. for the new railroad line, which has made a good impression in France. At the North some large orders have dropped in for prime Iron and Sheets. In the Haute-Marne, rolling mills restrict their output; Coke Merchant is there at 12 francs per 100 kg. In the Loire district prices are sustained, but new commands for railroad material are impatiently looked forward to. A good demand is kept up for Coal—current production is easily absorbed by it.

## BELGIUM.

(Moniteur Industriel.)  
BRUXELLES, May 7, 1883.—Iron.—The Belgian iron market is about as stagnant as it possibly can be; nobody can see when this disconsolate state of affairs is to end. There is a total absence of demand for Finished Iron, while Pig Iron remains as stiff as heretofore. Belgian rolling mills are in a poor plight indeed, being the victims of an untoward situation. They cannot sell their products at present except at losing rates, and, on the other hand, cannot get the slightest concessions from blast furnace owners. They would be glad to see a drop in Coal, but the demand for the latter is largely ahead of both stocks and output; hence everything operates against rolling mills and nothing in their favor. For Pig Iron they have to submit to the price of 6 francs, while Coal ranges between 9 francs and 11.50, and not over 11 francs can be obtained for Merchant Iron No. 1. We quote this week: English Foundry Pig, 5.90; Belgian do., 7.25, and Luxembourg, 6.25; Charleroi Puddling Pig, 6.25; Common do., 5.25 @ 5.75, and Athus-Hainaut, 5.75; Merchant No. 1, 13; No. 2, 12.75; No. 3, 12.50; Heama, 13.50; Corners, 14, and Sheets all the way between 17.50 and 25 for No. 2 and 3. The Government will soon be in the market again for 500 iron freight cars; their adjudication will be a good test. During the first quarter Belgium has imported 357,381 tons of Iron Ore, and exported 117,765 against last year 285,866, and 85,906. Pig Iron importations have amounted to 47,000, and the export to 2577, against last year 51,740 and 3545. The export of Finished Iron has been 37,130 tons, against 40,881 last year. Of Nails we exported 2145 tons this year, against 2040 in 1882; of Steel Rails, 14,000 tons, against none last year. Great firmness is still the characteristic of the Coal market; both the domestic and ex. port demand remains active. We have exported during the first four months of the year 90,549 tons, against 92,000, and 86,642 tons of Coke, against 272,721; the Coal import has been 275,474 tons, against 222,224 in 1882, and that of Coke 4837, against 4933.

## GERMANY.

## (Borzenhalle.)

HAMBURG, May 8, 1883.—Iron.—As for Finished Iron the tendency has remained tolerably good, but it has been different with respect to Pig Iron; the syndicate of blast-furnace owners has therefore decided to reduce notably the price of puddling Pig. The stock of finished iron on hand in our iron districts is quite light for the moment; still, in view of the large capacity of German rolling mills, no attempt is made to put up the price. Structural Iron in particular is in good request. German steel works have ordered orders on hand to last them at least for the coming quarter. About Pig Iron we may still mention that Gray, at the reduced price of 60 marks, is not a remunerative figure. Dusseldorf quotes as follows: Prime Spiegel, 72 marks per 1000; prim's Gray, 60; Luxembourg Pig, 44.60 @ 45; Charcoal ditto, 40 @ 45; Foundry No. 1, 71 @ 72; No. 2, 67 @ 68; No. 3, 65 @ 66; Spanish Foundry Pig, Muelata, at Ruhrort, 82 @ 85; English No. 1, 91 ditto, 61 @ 62; English Bessemer at port of shipment, 61 @ 62; German ditto, 61 @ 62; Common Merchant, 130; prime ditto, 155; Sheets, 170 @ 210, and rolled Wire for Wire Nails, 16 @ 140 marks per ton. Metals.—About Lead the Aix-la-Chapelle Co., in its report, remarks that it has taken a great strain in the district, both at the mines and smelting works, turning out 3000 tons more in 1882 than in 1881, while Spelter production has increased 3500 tons. This is a 12.5 increase in both in a single year. Lead production in Europe in 1882 has been 345,000 tons, against 290,000 tons in 1881, and 220,000 in 1880. Metals in the Hambro market have been inactive. Lead being quiet at 14 @ 14.50 marks per 100 kg. For German: Copper unaltered at 71 @ 80; Tin sustained at 104 @ 107, and Spelter without anything doing at 16 @ 16.25. Coal.—Still tending upward, being 5 marks higher in Westphalia than at this time last year.

## HOLLAND.

## (Kock &amp; Fierboom.)

ROTTERDAM, May 8, 1883.—Tin.—Although not much has transpired during the week in the way of sales, there has nevertheless been considerable

firmness, in view of good deliveries in April and moderate arrivals during the month. We quote to-day: June delivery of Billiton, 57.75; builders' 50 kg.; August do., 58.75, and spot, 58 asked, while Banca spot is worth 59 @ 59.25.

## Underground Electric Wires.

The Chicago Herald says: "The public test of the new system of electric transmission, as practically illustrated and introduced by the American Sectional Electric Underground Company, was repeated yesterday afternoon at the building erected for that purpose, at the corner of Twenty-third street and La Salle. The test was in every way satisfactory. The fact that electric wires for telegraph, telephone and electric-light purposes can, if properly insulated, be laid alongside of each other, inside the same conduit pipes, was once more shown, and more conclusively than on the day preceding. In this connection it is only proper to state that on the evening before, when most of the spectators and invited guests had already left the grounds, electric lights were set burning brightly, while telephone and telegraph messages were simultaneously sent over the wires in the same conduits, and that the lamps remained lit the whole night through and all of yesterday. Prof. Elisha Gray, who had meanwhile returned to the city, was so impressed with the success of the new system that he early yesterday called upon President Johnstone, of the company, at the Grand Pacific, and congratulated him most enthusiastically upon the results obtained the evening before. One objection urged against the new system by electricians, to the effect that the tests made were not conclusive evidence, as the wires had not been long enough in the conduits to be exposed to the wet or to the ingress of air, was answered by Mr. Johnstone yesterday. He said that on Friday, while the public test was made here in Chicago, a similar test was also made in Philadelphia, and that the telegraph had stated it to have been entirely successful. Now, the conduits laid there had been placed in soil consisting mostly of quicksand, and that, in spite of careful draining and every other precaution taken, the water for the ten days preceding had been constantly rising to the surface, so that the conduits had been literally submerged in water. Despite this fact, he said, the working of the different wires had been perfect and that certainly showed that the system was a good and sound one."

## Standard Test of Car Wheels.—About

35 master car-builders and representatives of the leading car-wheel firms in the country met at the Tift House, in Buffalo, a few days ago, and discussed the subject of a standard test of car wheels. According to the secretary of the meeting, Mr. D. M. Brady, the subject was considered for two or three hours, but no action taken. The meeting was an adjourned meeting from April 11 last. The sub-committee of master car-builders, consisting of Messrs. F. M. Wilder, of the Erie; L. Garry, of the New York Central; R. C. Blackal, Robert Metter and J. S. Leutz, met wheel manufacturers representing twelve leading firms, and adopted the following resolution: "That the torsional testing machine invented by Prof. R. P. Thurston, or any other equally accurate machine, for giving the tensile, torsional and transverse strain to materials, be adopted as a standard machine for making tests." The following was also adopted: "That railroad companies be requested to adopt a standard test showing a quality of materials used in the manufacture of wheels." Afterward, on motion of Mr. Garry, all car-wheel makers were requested to send to the meeting a statement of their views in regard to what the standard of quality of materials for car wheels should consist of, and how the test to ascertain the same shall be made. The discussion was a long one, and the meeting adjourned without naming a day to continue the subject.

## Locomotive Building.—Current reports

point to an increased and encouraging activity in the various locomotive works, few, if any, having found it necessary to diminish their force of workmen. An exchange, having made inquiries as to the outlook for this class of manufacture, reports that the Baldwin Locomotive Works, of Philadelphia, already have a full half of their capacity engaged for 1883. There is less pressure for early deliveries, and although some of their departments are running overtime, they are what may be termed comfortably situated as regards orders. They are running their usual force of 3000 hands, and have no present intention of reducing the number. The Baldwin Works have contracted to furnish engines to the Vera Cruz and Alvarado Railroad. The Portland Machine Co., of Portland, Me., have enough locomotive work on hand to occupy them until November. The three locomotive works at Paterson, N. J., are employing 3160 men. The Rogers Co. employ 17





## STEEL JACK SCREWS.

Steel is Fast Taking the Place of Iron in all Mechanical Tools.

At a slight extra cost it adds largely to the strength and efficiency of Jack Screws. It would be of great benefit to both dealers and consumers, if Steel Screws should at once come into use, as they cost only 10 per cent. more for the same size, and will probably do 50 per cent. more work. We have Steel Screws on hand of most sizes, and will make anything on our list at short notice.

For size and price see our catalogue for 1883, a copy of which will be sent on request.

## MILLERS FALLS CO.,

74 Chambers Street, New York.

**CHAMPLAIN**  
**Forged Horse Nails.**  
 MANUFACTURED BY THE  
**NATIONAL HORSE NAIL CO.,**  
 Vergennes, Vermont.  
 HOT FORGED AND COLD HAMMERED POINTED. MADE OF BEST  
 NORWAY IRON AND WARRANTED.  
 WAREHOUSE  
 97 CHAMBERS AND 81 READE STREETS, NEW YORK.  
**DURRIE & McCARTY, Sole Agents.**

## BIRMINGHAM IRON FOUNDRY,

BIRMINGHAM, CONN.

## SHEARS,

TO CUT FROM 4-INCH ROUND OR SQUARE, TO HOOP IRON, WITH OR WITHOUT ENGINE ATTACHED.

## SQUEEZERS.

ROTARY OR ALLIGATOR.

Chilled Rolls and Rolling Machinery Generally.

Iron Shingles.  
 Double Cap,  
 Corrugated,  
 Crimped,  
 Bead.

**MOSER & THOMPSON,**  
 Manufacturers of  
**IRON ROOFING AND SIDING.**  
 Send for Circular and  
 Price List No. 25. 28-32 River St., Cleveland, O.

**NORTH BROTHERS,**  
 23d & Race Sts., PHILADELPHIA, PA.,  
**HARDWARE MANUFACTURERS,**  
**LIGHT CASTINGS A SPECIALTY**  
 THE HENRY B. NEWHALL CO., 101 Chambers St., New York, and 47 Pearl  
 St., Boston (J. H. Work, Manager), Sole Agents.

**SOLE MANUFACTURERS OF THE**  
**"WEED IMPROVED" BORING FAUCET,**  
 For Molasses, Oil, Japan, Varnish, &c.

**"UNQUESTIONABLY THE BEST"**  
**LEMON SQUEEZERS**  
 IN THE MARKET ARE THE  
 Nos. 1, 2 and 3 "King" for  
 FAMILY, RESTAURANT AND HOTEL USE,  
 Send for descriptive circulars.  
**KYSER & REX,**  
 (Variety Iron Works.)  
 Manufacturers of  
 HARDWARE SPECIALTIES, IRON TOYS, NOVEL-  
 TIES AND HOUSE FURNISHING HARDWARE.  
 MAIN OFFICE AND FACTORY:  
**FRANKFORD, Philadelphia.** BRANCH OFFICE:  
 11 North Fourth St., Philadelphia.

**RIVETS**  
 ALL KINDS OF RIVETS.  
**CLARK & COWLES,** Plainville, Conn.

## A. E. DEITZ,

(Successor to Barnes & Deitz.)



**DURRIE & McCARTY, Agents,**  
 97 Chambers & 81 Reade Sts., New York.

**J. W. Gallaudet**



Cor. Broadway and Wall St., New York.  
 Bankers and dealers in COMMERCIAL PAPER.  
 Stocks and Bonds dealt in for cash or on margin at  
 New York Stock Exchange.

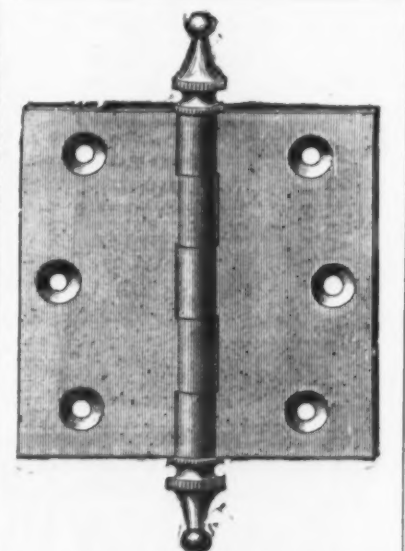
## QUAKER CITY LAWN MOWER.



Guaranteed Su-  
 perior to any other  
 Center Cut  
**MOWER**  
 ON THE  
**MARKET.**

THE QUAKER CITY Reduced in Price.

Now, why buy a worthless mower?  
**SEND FOR LIST.**  
**Lloyd, Supplee & Walton,**  
 Philadelphia.  
**DURRIE & McCARTY,**  
 New York.



## CAST BRASS BUTT HINGES,

Polished and Plain Finish,  
 Manufactured and kept in stock by

**W. & J. TIEBOUT,**  
 Manufacturers of  
**BRASS, GALVANIZED & SHIP CHANDLERY**  
**HARDWARE,**  
 Nos. 16 & 18 Chambers St.,  
 NEW YORK.

**CHESTERMAN'S**  
 Metallic and Steel Tapes,  
 SURVEYORS' LAND CHAINS,  
 STEEL RULES, &c.  
 IMPORTED BY

**WM. H. BELCHER,**  
 89 Chambers Street, NEW YORK.  
 Catalogues and Bottom Rates.

**TINIUS OLSEN & CO.,**  
 STANDARD SCALES  
 AND

**Testing Machines.**

Manufacturers of all descriptions of Testing  
 Machines. Tests made daily.

Office and Works, N. W. cor. 29th and  
 Cottonwood Aves., Philadelphia.

## L. COES' Genuine and Mechanics PATENT

## Screw Wrenches

MANUFACTURED BY  
**L. COES & CO.,**  
 Worcester, Mass.

ESTABLISHED IN 1840.



Our Genuine Wrenches are made with  
 straight bars, full width and enlarged jaw, hav-  
 ing ribs cast inside, which strengthen the jaw  
 and give a full bearing on front of bar. These  
 improvements, in combination with our new  
 ferrule, made with double bearings, an iron  
 tube, fitted to the shank and resting against  
 the lower bearings, rigidly held in position by  
 the handle and nut, effectually preventing back  
 thrust of ferrule use sectional view, verify  
 our claim that we manufacture the heaviest  
 and strongest Wrench in the market. None  
 genuine unless stamped.

**L. COES & CO.,**  
 Worcester, Mass.

Warehouse,  
 97 Chambers and 81 Reade Sts.  
 NEW YORK.

**DURRIE & McCARTY,**  
 Sole Agents.



1883.

PENNSYLVANIA.

## LAWN MOWER.

Has no Equal, Sur-  
 passing all others, and  
 pronounced

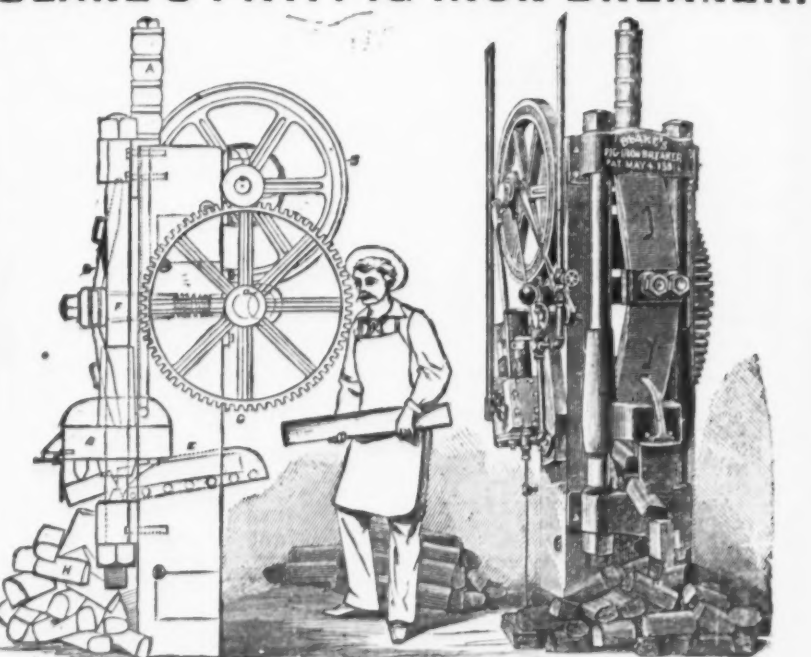
"THE BEST."

For descriptive catalogue and prices write to

**LLOYD, SUPPLEE & WALTON,** Philadelphia.  
**DURRIE & McCARTY,** New York.  
**AMES FLOW CO.,** Boston, Mass.  
**PRATT & CO.,** Buffalo, N. Y.  
**SIMMONS HARDWARE CO.,** St. Louis, Mo.  
**HAMILTON & MATTHEWS,** Rochester, N. Y.  
**MARKLEY, ALING & CO.,** Chicago, Ill.  
**HUNTINGTON, HOPKINS & CO.,** Sacramento  
 and San Francisco, Cal.  
**R. A. CULTER & CO.,** Peoria, Ill.  
**DUCHARME, FLETCHER & CO.,** Detroit, Mich.

**LOCKWOOD, VANDORF & TAYLOR,** Cleveland,  
 Wm. FRANKFURTH & CO., Milwaukee, Wis.  
**WALTER S. LUDLOW,** Cincinnati, Ohio.  
**LLOYD & CLARKE,** La Crosse, Wis.  
**H. WITHOFF & CO.,** Columbus, Ohio.  
**BURROUGHS BROS.,** Kansas City, Mo.  
**THE TOB-DONIGAN IRON CO.,** Louisville, Ky.  
**LAYMAN, CAREY & CO.,** Indianapolis, Ind.  
**THOMAS PURVEAR & SLOCUM,** Evansville, Ind.  
**A. E. BONESTEEL,** Troy, N. Y.

## BLAKE'S PAT. PIC IRON BREAKER.



A new and successful machine for breaking pig iron into any length desired, with rapidity and  
 economy. Besides saving in cost of breaking by hand, it secures the greatest economy in melting.  
 Several machines already in use. Every machine guaranteed against breakage of parts. Requires  
 but three horse-power. Can be run by belt or have small engine attached.

Send for Circulars, Prices, &c.  
**BLAKE CRUSHER COMPANY,**  
 Sole Makers, 85 Orange Street NEW HAVEN, CONN.

## LOVEJOY & DRAKE,

Manufacturers' Agents.

101 READE STREET, NEW YORK.

Iron & Chain, Heavy & Wagon Hardware

RAILROAD & BUILDERS' SUPPLIES, &c.

**ARTESIAN WELL MACHINES.**

For our Full Page Advertisement, See First Issue of Each Month.

**FITTINGS.** Malleable and Gray Iron, All Kinds.  
**STAR MACHINE WORKS.** Write for Prices.  
 Cleveland, O.



## WASHINGTON LETTER.

(From Our Own Correspondent.)

WASHINGTON, D. C., May 23, 1885.

Senator Beck passed through the city a few days ago, and, in reply to an inquiry as to his letter on the tariff question, said that it would be ready shortly and be a complete defense of the position of the Democratic party in favor of the most liberal construction of the tariff for revenue only. The Senator sustains the extreme views of the recent Kentucky convention on tariff matters, and pronounces its resolutions the keynote of the Democratic campaign of 1884. He fully coincides with the Wattersonean ideas on that subject, and will use all his influence to secure the election of a Speaker and the nomination of a President committed to those views. The ultra ring, represented by such men as Beck, Watterson, Morrison, Springer, and many others, is absolutely irreconcilable on the tariff, and from present indications there will be considerable commotion in the camp before it is disposed of.

## TARIFF ONLY FOR REVENUE.

The proposition of Governor Butler to substitute "tariff only for revenue" for "tariff for revenue only" is looked upon in political circles here as one of those neat pieces of demagogism for which the versatile Governor of the old Bay State is somewhat notorious. The two propositions show a distinction with very little difference. It is not likely that the people will be snared by that sort of chaff, but it would still be as well for them to keep their eyes open or they may find themselves in the meshes before they know it. It is claimed for the new-fangled doctrine of "tariff only for revenue" that it recognizes a certain degree of protection. The answer among public men here is, Then why not call it by its right name, or a "tariff for the protection of American manufactures and labor?" This specimen of Butlerism is looked upon as the merest subterfuge.

## A NATIONAL FOUNDRY.

Since the question of establishing a national foundry has been mentioned there has been a perfect avalanche of suggestions, epistolary and oral, received at the department in favor of divers localities. The statement accredited to a member of the Naval Board, that his colleagues were surprised at the recent failure of the Pittsburgh steel manufacturers to make steel guns that were acceptable to the naval officers, has naturally caused no small degree of excitement in iron and steel circles. The statement is also accredited to one of the board that "we had expected that Pittsburgh could not be outdone in this line, but were disappointed. Boston men lead the Pittsburghers. They made some magnificent guns." This is regarded as a bid for Boston. The fact of the Secretary of the Navy hailing from that section seems to encourage that idea. For the purpose of casting the proposed steel guns it would naturally be supposed that localities most largely interested in steel manufacture would be preferred. The subject will doubtless lead to a great deal of agitation before it is finally disposed of.

**REDUCTIONS IN THE TARIFF OF VENEZUELA.**  
The Department of State is in receipt of the Executive decree of January 26, 1885, removing the import duty of 30 per cent. upon goods introduced into Venezuela by way of the Antilles. The following is an official translation of the text:

**Article 1.** The products, goods and merchandise exported from Europe and the United States to Venezuela, and accompanied with all the documents required by the customs laws, may be transhipped in foreign colonies from one vessel to another to proceed to their destination, and will be considered as arriving directly from the original points of export.

**Article 2.** When, by lack of immediate transport, it may become necessary to disembark the said products, goods and merchandise in foreign colonies, they may be re-embarked for Venezuela without being considered as Colonial exports, always provided that, in addition to the consular documents from the port of original dispatch, the owners or consignees present at the customhouse of the Republic where the goods are landed a certificate from the Venezuelan consul in the Colony asserting that the said goods were only there on deposit for lack of vessels to take them to their destination.

**Article 3.** The provisions of the foregoing articles will take effect from the 15th of February next in all the custom-houses of the Republic.

## Sunday Railway Work.

According to the *Railway Age*, of Chicago, Col. Bennett H. Young, president of the Louisville, New Albany and Chicago Railroad, has issued an order that, so far as possible, no work shall be done or trains be run on the road on the Sabbath day. Passenger trains only will be run for carrying mails, and efforts will be made to arrange for their discontinuance. In cases of perishable goods or live stock, freight trains will run when necessary only. The order further says: "You will in future run no excursion trains of any kind for any purpose during the Sabbath. This order applies to camp-meeting trains. If the Christian people cannot find other places for worship, this company will not violate divine and civil law and deny its employees the essential rest of the Sabbath to carry them to the camp-meeting ground." I am also informed that a number of the company's employees have conscientious scruples against any work on the Sabbath day. There are likely others who do not feel so strongly on this subject. Under no ordinary circumstances must any employee who objects on the ground of his religious convictions be ordered or required to do any service Sundays. If any difficulties arise in the execution of this regulation you will please report them to me for consideration, and you will also notify the employees of their right, on conscientious grounds, to be fully protected in the observance of the day of rest."

In commenting upon the above our contemporary says: "All railway managers agree that the entire avoidance of work on Sunday is desirable, but it is generally felt that this is impracticable. President Young's fearless action, however, has called new attention to the subject and may result in at

least a diminution of Sunday labor. It is difficult to see how a total stoppage of railway operations on that day can be effected, because there are certain mail and suburban trains—the latter carrying many church-goers and funerals—which will be demanded by the public and which have come to be considered necessities. But that some of the passenger and excursion trains might be taken off without public detriment, and that the running of Sunday freight trains might be entirely abandoned—although this would be a very difficult matter on many lines—there can be no doubt. We also fully believe that the physical and moral condition of railway men would be greatly improved by the recognition of a day of rest in every week. The Louisville, New Albany and Chicago company will doubtless suffer a very considerable loss of revenue, as its Sunday excursion and camp-meeting trains have been very profitable, and its president is certainly entitled to great respect for inviting this loss solely on conscientious grounds. It is a strange inconsistency, by the way, that representatives of the Methodist church, which strongly denounces Sabbath labor, give this railway the strongest inducements to run Sunday trains by voting to keep their camp-meeting grounds open on that day, so as to attract visitors from the city. That a railway officer should stand up for Sunday observance in the face of temptation from the churches themselves is certainly remarkable. The subject has many phases, and conclusions ought not to be formed without careful consideration."

## LATE PUBLICATIONS.

**Marine—Recent Practice in Marine Engineering.** By William H. Maw; to be completed in 12 monthly parts, imperial 4to; 1885. Each, \$1.

This work is intended to give an illustrated account of the leading types of marine engines constructed in the past ten years in this country and in Europe. Besides marine engines, it will also contain descriptions and illustrations of other machinery, such as dredges, engines for cable-towing systems on rivers and canals, &c. Parts I, II and III, now ready.

## CONTENTS OF PART III.

Text: 1. Experiments on the Engines of the United States Revenue Steamers Richard Rush, Samuel Dexter and Alexander J. Dallas (with Illustrations in Text); 2. Experiments on the Engine of the United States Revenue Steamer Albert Gallatin (with Illustrations in Text).

Plates: 27. The United States Revenue Steamer Richard Rush; 28. Engines of the United States Revenue Steamer Richard Rush; 29. Details of Engines of the United States Revenue Steamer Richard Rush; 30. United States Revenue Steamers, Propeller and Boiler of the Richard Rush, and Boiler of the Gallatin; 31. Compound Engines of the S. S. Mexican; 32. Compound Engines of the S. S. Mexican; 33. Boilers of the S. S. Mexican; 34. Swiss Engines for Steam Launch; 35. Compound Engines for H. M. S. Coquette; 36. Details of Compound Engines for H. M. S. Coquette; 37. Compound Engines for the Steam Launch Bell Bird; 38. Compound Engines of the S. S. Itata.

**Hale, P. M.—The Woods and Timbers of North Carolina.** New edition, 270 pages, 12mo, cloth; 1883. \$1.25.

This work is a compilation from the botanical and geological reports of Drs. Curtis, Emmons and Kerr, to which are added information obtained from the Census Bureau, and accurate reports from the several counties.

Sent postpaid, on receipt of price, by

**DAVID WILLIAMS,**

Publisher and Bookseller,

83 Reade St., NEW YORK.

**WORTHINGTON & SONS,**

MANUFACTURERS OF

**GRINDSTONES**

FOR ALL PURPOSES.

Scythe Stones and Mounted Grindstones.

Cor. Front and River Sts., CLEVELAND, OHIO.

**SITES & GILL,**

222 and 224 S. Third St., Phila., Pa.

DEALERS IN SCOTCH AND AMERICAN

**PIG IRON,**

Old Rails, Scrap and Railroad Supplies.

SCRAP IRON a Specialty.

**JOS. J. LIPPINCOTT & CO.,**

General Iron Brokers

And COMMISSION MERCHANTS,

131 South Fourth Street, PHILADELPHIA.

Advances made. Consignments solicited.

## PATENT AUTOMATIC STOP

**ELEVATORS**

AND

**DUMB WAITERS,**

HYDRAULIC OR STEAM POWER.

SPEED, 50 TO 500 FEET PER MINUTE, WITH PERFECT SAFETY.

The fastest Belt Machine in the Market running noiselessly. Can be stopped at any floor with certainty without an attendant. Especially adapted to high speed Freight and Package business. Address

**TEWKSBURY AUTOMATIC ELEVATOR CO.,**

OFFICE AND FACTORY,

275, 277 & 279 Passaic St., NEWARK, N. J.

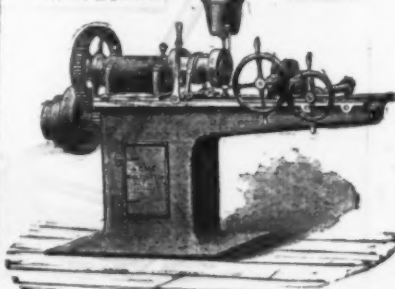
**GEO. B. CARPENTER & CO.**  
SUCCESSORS TO  
**GILBERT HUBBARD & CO.**  
DEALERS IN

**SUPPLIES**  
FOR ROLLING MILLS  
**MANUFACTORIES**  
**MINING**  
COMPANIES  
& RAILWAYS  
H. W. JOHNS'

**ASBESTOS**  
ROOFING, BOILER COVERING  
**STEAM PACKING,**  
MILL BOARD, GASKETS  
SHEATHINGS, FIRE PROOF  
COATINGS, CEMENT & C.  
SEND FOR CIRCULARS  
202 & 208 S. WATER ST., CHICAGO.  
MENTION THIS PAPER.

"ACME" BOLT CUTTERS  
WITH CAP DIES.

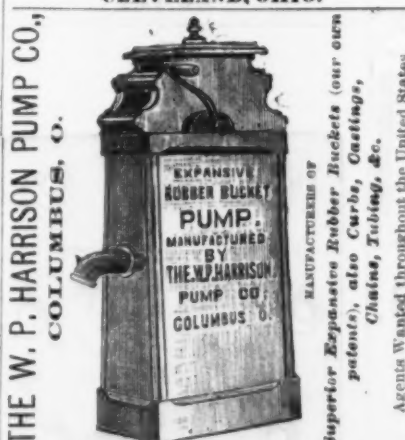
M. D. LUEHR'S PATENT.



Double Automatic Bolt Cutters. Single Bolt Cutters, 4 in. to 4 1/2 in. Rapid Bolt Cutters, 4 1/2 in. to 5 1/2 in. Rapid Nut Tappers, 5/4 and 5/8 Spindles, Bolt Headers, four different styles. Bolt Pointers, Nut Presses, &c.

**NOVELTY IRON WORKS**

CLEVELAND, OHIO.



**STILLMAN & Co.**  
**Engraving**  
ON WOOD  
N.W. COR. FRONT & VINE  
CINCINNATI OHIO.

**Print Your Own**  
CARDS, Presses, &c.  
Large sizes for circulars, &c., \$2 to \$5.  
For pleasure, money making, young or old. Everything easy, printed instructions. Send 2 stamps for Catalogue of Presses, Type, Cards, &c. to the factory  
KELSEY & CO., MERIDEN, CONN.

**LATHES.**

Double and Treble Geared Heavy 25-inch Engine Lathes of new and improved design.

**GEO. A. OHL & CO.,**

E. Newark, N. J.

# TO CONSUMERS OF TIN PLATES.

Owing to the importation of Private Brands, and so many of the cheapest Charcoal and Coke Bright and Roofing Plates, we would suggest, in the interest of the buyer, and fair competition among sellers, that in your asking for quotations you insist on the Brands being mentioned, and not permit plates to be offered you by grades.

As importers, we cannot and will not compete against grade quotations, as we are unable to know the numerous Brands now put in Grades to suit the seller and at a sacrifice to fair competition.

**MERCHANT & CO.,**

IMPORTERS

**TIN PLATES, METALS, &c.**

MANUFACTURERS

**SUPERIOR SOLDER, BABBITT METAL, &c.**

PHILADELPHIA AND NEW YORK.

## CAUTION.

THE

**"Peter Wright" Patent Anvil.**

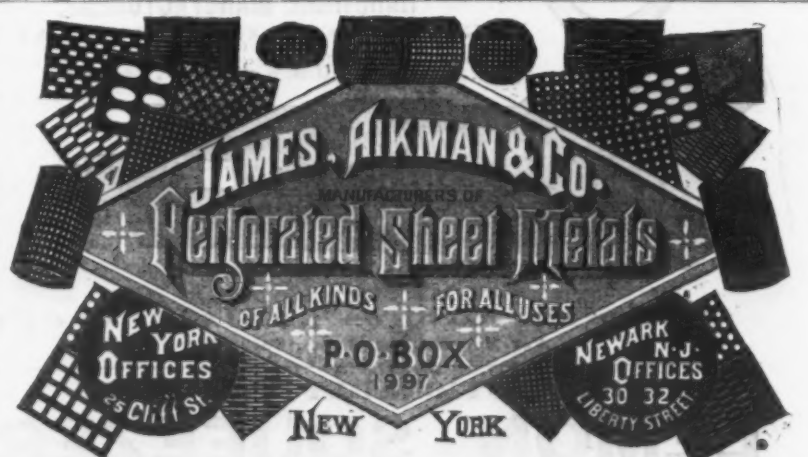
It having come to our knowledge that Anvils of inferior make, and marked in a manner calculated to mislead buyers, are being sold as the "PETER WRIGHT" ANVIL, we beg to inform all buyers that all our Anvils are stamped on the side

**PETER  
WRIGHT  
PATENT**

SOLID  
WROUGHT

and none are genuine unless they bear these marks. We also gum a green label on the other side of Anvil.

**PETER WRIGHT & SONS.**



**LEWIS'S PATENT BELT PROTECTOR**  
is meeting with a demand entirely beyond all anticipation. The following, however, tells the story of its signal success:

ALBANY ELECTRIC ILLUMINATING CO., ALBANY, April 21, 1885.  
Mr. E. S. LEWIS: Sir,—We are now using your BELT PROTECTORS on several of our belts, and as they give perfect satisfaction, I intend applying them as occasion may require.  
Yours, &c., E. A. MAHAR, General Manager.

FOUNDRY FACTORS AND FOUNDERS' SUPPLIES,  
ALBANY, N. Y., March 31, 1885.  
Mr. EDWARD S. LEWIS: Dear Sir,—It affords us great pleasure to state that your "BELT PROTECTORS," which were applied to the belts in our mill last fall, have been the means of saving us considerable expense, inasmuch as we should have been compelled to replace them at considerable outlay, whereas now they are in as good condition as when put in, with every prospect of remaining so for a long time to come.  
NEW YORK DEPOT AND AGENCY: DEWEY MFG. CO., 29 Chambers St.

SOLEMANUFACTURER AND PROPRIETOR,  
**EDWARD S. LEWIS, 16 Herkimer St., Albany, N. Y.**

**THE HARTFORD HAMMER CO., Hartford, Conn.**



Manufacturers of Solid Cast Steel Hammers, fully WARRANTED.

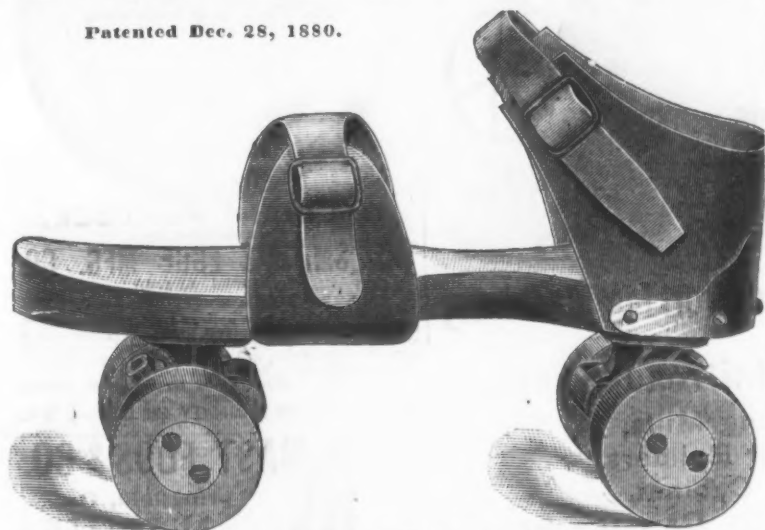
All Hammers stamped "HARTFORD" and See first issue of each month.



# BEST CAST TRADE MARK U.S. TOOL STEEL BROWN & CO. PITTSBURGH, PA.

## PISTON ROLLER SKATE.

Patented Dec. 28, 1880.



Scientifically Constructed, Combining Ease of Motion, Lightness, Strength and Durability.

THE MOST COMPLETE SKATE IN THE MARKET.

For Illustrated Catalogue, Prices, &amp;c., address

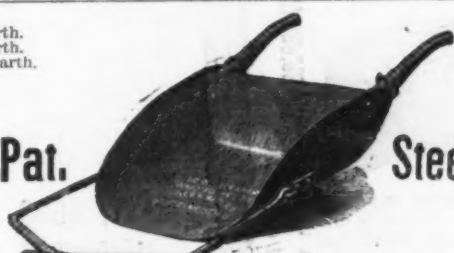
**POPE & STEVENS,**

HEADQUARTERS  
**Barney & Berry's**  
CELEBRATED  
Club Skates.

MANUFACTURERS OF  
Dog Collars, Roller Skates and Leather Goods,  
114 Chambers St., NEW YORK.  
501 Commerce St., PHILA.

HEADQUARTERS  
C. S. OSBORNE'S  
CELEBRATED  
TOOLS.

No. 1 Carries 7 feet earth.  
No. 2 Carries 5 feet earth.  
No. 3 Carries 3½ feet earth.



PATENTED  
December 27th, 1881.

The York Pat.

Steel Scraper

The Lightest and Strongest Scraper made. The body is made of one single piece of steel. The handles are fastened inside of fold, and free from all obstructions. The body, ball and runner are all made of steel. Especially suited for contractors. Send for circulars. Manufactured by

THE YORK MFG. CO., Limited, Portsmouth, Ohio.

## J. STEVENS & CO.,

Chicopee Falls, Mass., P. O. Box 224,

Manufacturers of

## Spring Calipers and Dividers.

Also, Surface Gauges and Counter Sinks, Stevens' Patent Breech-Loading Sporting Rifles, double and single barrel; Shot Guns, Pocket Rifles, Pocket Pistols, and the noted Hunters' Pet Rifles. Our

## SHOOTING GALLERY RIFLE

Is the favorite everywhere.

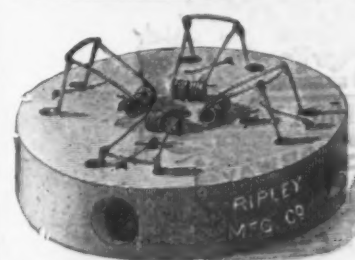
SEND FOR ILLUSTRATED CATALOGUE.



## THE AETNA GRATE.

This is a practical and thoroughly successful SLAKING GRATE BAIL. Has been in use over five years, and in many of the largest manufacturing concerns in the country. Simple in construction, positive and efficient in its operation, easily worked (being operated in sections in wide furnaces), gives over sixty per cent. Air Surface. Very durable, interchangeable, and can be put in any furnace without delay or change of any kind. Descriptive circular, price, etc., sent on application.

AETNA GRATE BAR COMPANY,  
GEORGE H. CLARK, Manager.  
RICHARD THOMPSON, Agent, 110 Liberty St., New York.



## "COMMON SENSE" MOUSE TRAP. BEST IN MARKET.

For Home &amp; Export Trade.

## RIPLEY MFG. CO.,

Unionville, Ct., U. S. A.,

Manufacturers of  
Porcelain-Lined Lemon Squeezers, Mallets, Rose-wood Faucets, Patent Boot Jacks and Hardware. Fine Wood Turning a Specialty.

## PREPARED BILLINGS, TAYLOR & CO.,

CLEVELAND, OHIO,

## HOUSE PAINTS

Color Makers, Varnish Makers,

AND

PAINT MANUFACTURERS.

READY FOR USE. Send for Sample Card and Catalogue.

## J. HAISH & CO.,

SOLE MANUFACTURERS OF

THE RATTLER.



Haish's 8 Barb Steel Fence Wire, the Pioneer and Duplex Galvanized and Enamelled; barbs locked on with wire, and possesses more excellent quality than any fence ever produced. We also call your attention to the Jacob Haish Wire Fence Stretcher, Double Crank, Double Rope, Center Draft, and "drawn to the pub" as the best device in the world for stretching wire fences. Every stretcher guaranteed to do perfect work or no sale. Send for sample and price list. Liberal discount to jobbers.

HOME OFFICE, DE KALB, ILL.

## NEW CHAMPION FORCE PUMP.

HAS

Vacuum Chamber and

Air Chamber,

PRODUCING

A CONTINUOUS FLOW

OF WATER,

Both in Suction and Discharge,

AND THEREFORE

WORKS SMOOTHER

AND

EASIER

THAN ANY OTHER FORCE

PUMP IN THE MARKET.

HAS

Seamless Drawn Brass Cyl-

inders and No Stuffing

Boxes.

Never Freezes in Winter, and is Not

Liable to Get Out of Order.

With hose attachment it is valuable as a fire protection, and for

sprinkling lawns, gardens, &amp;c.

It is light, neat, and easy to

handle, and yet strong, substantial

and durable, and is adapted to

all kinds of wells, dug, drilled or

driven. Send for descriptive circular

and price list.

CLARK BROS.,

BELMONT, N. Y., U. S. A.,

SOLE MANUFACTURERS.

## SOUND DEADENED

IN FLOORS AND WALLS OF

FACTORIES,

STORES,

AND DWELLINGS,

By the Fire-Proof Material  
Called Mineral Wool.

The POOREST CONDUCTOR of heat  
yet offered. CHEAP and DURABLE.

Sample and circular free by mail.

## U. S. MINERAL WOOL CO.,

22 Cortlandt St., New York.

## THE DETROIT LUBRICATOR CO.'S

CONTINUOUS-FEED

## LUBRICATOR CUPS,

for oiling valves and cylinders of steam engines by the only perfect method, through the steam pipe. The oil passes in sight, drop by drop, into the column of steam, where it vaporizes, thus becoming a steam lubricant, oiling perfectly every part reached by the steam. Any clean oil, black or white, light or heavy, may be used. Saves from 40 to 50 per cent. in oil and wear of machinery, thus paying for itself several times a year. A cup will be sent to responsible parties on 30 days' trial if desired. In ordering, give diameter of cylinder.

Note.—In our recent suit against the American Lubricator Co., of Detroit, before Justice Stanley Matthews, of the U. S. Supreme Court, involving their "sight feed" feature, a decree was rendered in our favor August 25, 1881. Address,

DETROIT LUBRICATOR CO.  
Office, 129 GRISWOLD ST., Detroit, Mich.  
Mention The Iron Age.

## NEW MAKE OF MINE LAMP

THREE DIFFERENT SIZES  
SEND 15 CENTS FOR SAMPLE TO  
SEAMLESS BRASS COLLAR, BRASS HINGE, Solid Lid.  
NO SOLDERING THE HINGE CANNOT MELT OFF.

LEONARD BROS., Scranton, Pa.

## HOOSIER SAW WORKS.

W. B. BARRY Saw Manufacturer

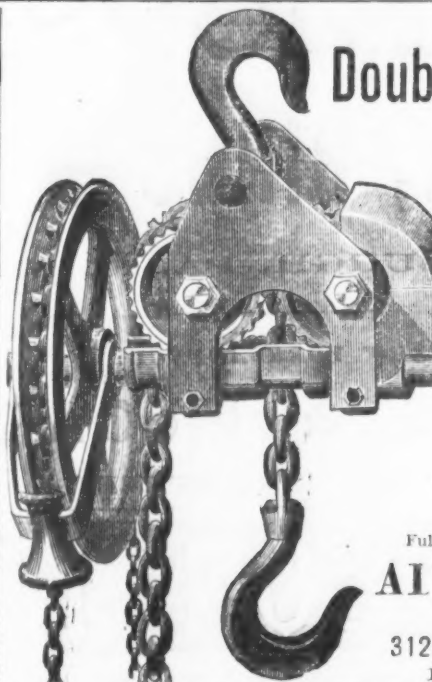
132 &amp; 134

South Pennsylvania St., Indianapolis, Ind.

Saws, Gummers, Files, Belting & Emery Wheels.  
ALL WORK FULLY WARRANTED.

BOX'S PATENT

## Double Screw Hoists.



The unbounded reputation these Hoists have gained for themselves the last four years has no equal. There are now over 7000 in use. Large manufacturers have duplicated their orders a dozen times over. They are in use by all city departments, railroad companies, the United States Government, the English Government, the French Government, the Chinese Government, and in Russia, Germany, Chili, Brazil, Venezuela and Cuba. They have been awarded three silver medals and five diplomas. One trial will convince you they are the best in every particular. Sizes, 500 lbs. to 40,000.

Superior Hand and Power  
Traveling Cranes, from  
1 to 40 tons.

Elevators for Heavy Work, 1 to  
10 tons capacity.

Radial Drills of the Most Im-  
proved Kind.

Full Illustrated Circular on application.

**ALFRED BOX & CO.,**

Northern Liberty Works,

312, 314 and 316 GREEN STREET,  
PHILADELPHIA, PA.

## ILLINOIS IRON & BOLT CO.,

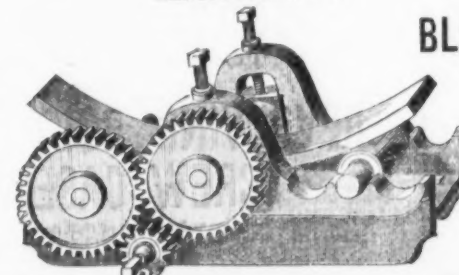
No. 20 to 26 Main St., CARPENTERSVILLE, KANE CO., ILL.,

MANUFACTURERS OF

BLACKSMITHS'

THIMBLE

SKEINS,



TOOLS.

## TIRE BENDER NO. 3.

JACK SCREWS, SADIRONS, COPYING PRESSES  
AND STANDS, &c.



IMPROVED SHEET IRON ROOFING.

Best quality and simplest plan in use

MANUFACTURED BY

T. C. SNYDER &amp; CO., Canton, Ohio.

Cheaper, stronger, and less liable to get out of repair  
than tin. Any mechanic can apply it. Sample Circular  
and Price List free by mail at request.

Also, Agents for LOWE'S METALLIC PAINT Best and Cheapest.  
Manufacturers Putz Patent Rein Holders and  
Davis Rock Drill Machines.

## SANDS' TRIPLE MOTION WHITE MOUNTAIN ICE CREAM FREEZERS.

THE WHITE MOUNTAIN FREEZER COMPANY are headquarters for Ice Cream Freezers and Ice  
Crushers, being the only firm in the United States who manufacture all parts of the raw material. The  
Examining Committee, consisting of 50,000  
Citizens of the United States, have recom-

mended the Sands' Triple Motion  
White Mountain Freezer to all per-  
sons in the world, for the following rea-  
sons: We have used them; they freeze  
quicker than any other; they save time,  
salt and ice; the triple motion makes  
smooth cream without lumps; makes  
more of it; galvanized iron outside; tin  
inside; no zinc in contact with the  
cream; easily adjusted; substantially  
made; simple in construction; perfect  
in results. Send for descriptive circular  
and discount of this celebrated Freezer.

Address,  
White Mountain Freezer Co.,  
ICE CRUSHER,  
Nashua, N. H., U. S. A.

SPECIAL ATTENTION GIVEN TO EXPORT ORDERS.

## PRIZE MEDALLISTS.

Exhibitions of 1862, 1863, 1867, 1872, 1873, and only Award and Medal for Noiseless Steel  
Shutters at Philadelphia 1876, Paris 1878, and Melbourne 1881.

## CLARK, BUNNETT & CO., Limited,

Late CLARK &amp; COMPANY,

Original Inventors and Sole Patentees of

Noiseless, Self-Coiling, Revolving Steel Shutters.

Fire and Burglar Proof Also, improved ROLLING WOOD SHUTTERS of various kinds, and Patent

METALLIC VENETIAN BLINDS.

Office and Manufactory, - - 162 &amp; 164 West 27th Street, New York.

## STEPHENS PATENT VISE.

50 PER CENT. of time and labor saved by every mechanic  
using this solid, quick-working Vise. Strongest and  
most durable of any Vise in the market. Has the latest  
improved taper, pipe, and other attachments.

For Sale by the Trade.

Office 41 De Street New York U. S. A.

## GARRY IRON ROOFING COMPANY

Largest manufacturers of Iron

Roofing in the world. Manu-

facturers of all kinds of

IRON ROOFING, Crimped and Corrugated Siding,

Iron Tile or Shingle, Fire-Proof Doors, Shutters, &amp;c.

Send for Circular and Price List No. 5.

IRON ORE PAINT AND CEMENT.

150-158 MERWIN STREET, CLEVELAND, O.

Merrill Brothers, 26 First Street, BROOKLYN, N. Y.

## DROP

HAMMERS,  
FORGINGS and  
POWER PRESSES.



**SHOVELS, SPADES  
AND  
SCOOPS,**  
MANUFACTURED BY  
**HUSSEY, BINNS & CO.,**  
PITTSBURGH, PA., U. S. A.

NEW YORK AGENCY:  
**DURRIE & McCARTY,**  
97 CHAMBERS STREET.

No. 921. No. 3041.

**JEFFERSON NAILS**  
ALSO  
**JEFFERSON PIG IRON.**  
Forge and Foundry, JEFFERSON IRON WORKS.  
Office and Works, STEUBENVILLE, OHIO.  
W. H. WALLACE, President. C. H. DOTY, Vice-President. GEO. P. HARDEN, Secretary.

**THE AMERICAN BOLT AND  
SCREW CASE CO.,**  
DAYTON, OHIO.  
MANUFACTURERS OF  
**REVOLVING BOLT AND  
SCREW CASES.**

We are the only manufacturers of Bolt cases and the only parties who make lists of Bolt or Screw Cases to suit stock of purchaser without extra charge. All goods guaranteed. Send for illustrated Circular.

PRINCIPAL AGENTS:  
Markley, Ailing & Co., Chicago; Ducharme, Fletcher & Co., Detroit, Mich.; Burger & Baumgard, New York City; Lloyd, Stimpie & Walton, Philadelphia, Pa.; Bucher, Bombardier & Co., Philadelphia, Pa.; Samuel C. B. Cook & Co., Baltimore, Md.; Bindley Hardware Co., Pittsburgh, Pa.; A. P. Shapleigh & Cantwell Hardware Co., St. Louis, Mo.; Farwell, Osburn & Jackson, St. Paul, Minn.; Howell, Gano & Co., Cincinnati, O.; Pappenheim Hardware Co., Cincinnati, O.; Hall & Willis Hardware Co., Kansas City, Mo.; Pratt & Co., Buffalo, N. Y.; Seeburger, Breaker & Co., Chicago, Ill.; H. O. Stratton, Boston, Mass.; Shultz & Hosen, St. Joseph, Mo.; Wyeth Hardware Co., St. Joseph, Mo.; A. Baldwin & Co., New Orleans, La.; Gordon Hardware Co., San Francisco, Cal.; Kilbourn, Jones & Co., Columbus, O.; Morley Bros., East Saginaw, Mich.

We are also extensive manufacturers of Fruit Can Sealing Wax. Send for Circulars and Prices.

Very Respectfully,

**THE AMERICAN BOLT & SCREW CASE CO.**  
**V. G. HUNDLEY,**  
PROPRIETOR OF  
**NORTH CAROLINA HANDLE CO.**

MANUFACTURER OF  
**Handles and Spokes,**  
79 Reade Street and 97 Chambers Street, NEW YORK.  
HARDWARE COMMISSION MERCHANT.

**HORSE OR OX MUZZLES.**  
PAINTED OR GALVANIZED.  
LOWEST PRICES AND BEST GOODS.  
**BROMWELL BRUSH & WIRE GOODS**  
CINCINNATI, O.  
W. H. QUINN & CO., 99 Chambers Street New York.

**THE LEFFEL**  
IMPROVED DOUBLE TURBINE  
MINING  
WATER-  
WHEEL,  
Designed for mining purposes and the utilization of water power with limited quantity of water and high heads. Being placed on horizontal shaft, the power is transmitted direct to shafting by belts. For further information and free illustrated catalogue, address  
**JAMES LEFFEL & CO.**  
Springfield, Ohio, or 7110 Liberty St., N. Y.

**RHODE ISLAND HORSE SHOE CO.,**  
MANUFACTURERS OF  
**Horse, Mule & Snow Shoes of the Perkins Pattern.**  
Works at Valley Falls, R. I. Office, 31 Exchange Place, Providence, R. I.  
W. CARPENTER, President. C. H. PERKINS, Gen'l Manager. R. W. COMSTOCK, Secretary.

**WOOD-WORKING MACHINERY**  
FOR  
Railroad Shops,  
Planing Mills,  
Car Builders,  
Cabinet,  
Carriage, Sash,  
Door and Blind  
Makers.

**GOODELL & WATERS,**  
Thirty-First & Chestnut Sts.,  
PHILADELPHIA, PA.  
Send for Circular.

**THE JENKINS STANDARD PACKING**  
TRADE MARK

**THE JENKINS STANDARD PACKING**  
is acknowledged by users as the Best in the world. Unlike all other Packings, the Jenkins Standard Packing can be made any thickness desired in a joint by placing two or as many thicknesses together as desired, and following up joint it vulcanizes in place and becomes a metal of itself (it is frequently called Jenkins Metal) and will last for years, as it does not rot or burn out. Avoid all limitations, as a good article is always subject to cheap imitations. The genuine has stamped on every sheet, "Jenkins Standard Packing," and is for sale by the Trade generally. Manufactured only by  
**JENKINS BROS.,**  
PROPRIETORS JENKINS PATENT VALVES, PACKING, &C.  
71 JOHN ST., NEW YORK.

**MILTON SIEVE CO., Limited, Milton, Pa.**  
**FIRE BRICK,**  
Gas Retorts,  
CUPOLA AND FURNACE  
LININGS,  
LOCOMOTIVE TILE,  
all kinds of Fire Clay Goods and  
Double Strength Culvert Pipe  
Output for 1882, 30,000 tons. Through care loaded at factory for all accessible points.  
**EVENS & HOWARD,**  
916 Market St., ST. LOUIS, MO.  
Send for Prices and Freight Rates.

**C-SPRING CART CO.,**  
RUSHVILLE, IND.  
We are making a Road Cart that is strong, light, easy on the horse and rides as easy as a buggy. Easy to get in and out of. Cut shows No. 3, with seat swung back ready to enter. Write for catalogue and prices.

**CHEAPEST STEAM PUMP IN THE WORLD!**  
**THE UNIQUE**  
Boiler Feeder  
STRICTLY FIRST CLASS,  
IN EVERY RESPECT.  
SEND FOR  
New & Reduced Price List  
FREE ON APPLICATION  
MANUFACTURED BY  
THE MILLER COMPANY,  
CANTON, OHIO.  
Satisfaction Guaranteed or No Pay!

**GEO. M. EDDY & CO.**  
Manufacturers of  
**Measuring Tapes**  
Of Cotton, Linen & Steel.  
ALL PURPOSES.  
351 to 353 Classon Ave. Brooklyn N. Y.

**CONCORD AXLES**  
Manufactured only by CONCORD AXLE CO.,  
D. ARTHUR BROWN, Treasurer,  
FISHERVILLE (CONCORD), N. H.  
**B. BURBANK & CO.,**  
the only present Miners and Shippers of  
**FLUOR SPAR,**  
EVANSVILLE, IND.

**WOOD-WORKING MACHINERY**  
FOR  
Railroad Shops,  
Planing Mills,  
Car Builders,  
Cabinet,  
Carriage, Sash,  
Door and Blind  
Makers.

**GOODELL & WATERS,**  
Thirty-First & Chestnut Sts.,  
PHILADELPHIA, PA.  
Send for Circular.

**THE JENKINS STANDARD PACKING**  
TRADE MARK

**THE JENKINS STANDARD PACKING**  
is acknowledged by users as the Best in the world. Unlike all other Packings, the Jenkins Standard Packing can be made any thickness desired in a joint by placing two or as many thicknesses together as desired, and following up joint it vulcanizes in place and becomes a metal of itself (it is frequently called Jenkins Metal) and will last for years, as it does not rot or burn out. Avoid all limitations, as a good article is always subject to cheap imitations. The genuine has stamped on every sheet, "Jenkins Standard Packing," and is for sale by the Trade generally. Manufactured only by  
**JENKINS BROS.,**  
PROPRIETORS JENKINS PATENT VALVES, PACKING, &C.  
71 JOHN ST., NEW YORK.

**EXCELSIOR AND  
CLIPPER  
LAWN MOWERS**  
GUARANTEED  
BEST & CHEAPEST  
LARGE REDUCTION  
IN PRICE  
**HAND  
MOWERS  
10 TO 20 IN.  
HORSE  
MOWERS  
25 TO 40 IN.**  
**CHADBORN &  
COLDWELL  
MANUF'G CO.**  
NEWBURGH, N. Y.  
Send for Circular  
and Price-List.

**Patent Portable Valve Seat  
Rotary Planing Machine.**

**L. B. FLANDERS MACHINE WORKS,**  
1025 Hamilton St., Philadelphia, Pa.  
Descriptive Circular on application.

**SMITH'S NEW MODEL  
REVOLVERS.**

Sold by Gun and Hardware  
Trade Everywhere.  
**OTIS A. SMITH, Manufacturer, Rockfall, Ct.**

**CONCORD AXLES**  
Manufactured only by CONCORD AXLE CO.,  
D. ARTHUR BROWN, Treasurer,  
FISHERVILLE (CONCORD), N. H.  
**B. BURBANK & CO.,**  
the only present Miners and Shippers of  
**FLUOR SPAR,**  
EVANSVILLE, IND.

**THE FALLS RIVER  
IRON  
RIVETS**  
MANUFACTURERS OF  
**NORWAY IRON RIVETS  
AND BURRS,**  
AND ALL SIZES OF  
**WROUGHT IRON WASHERS.**  
GENERAL NEW ENGLAND AGENTS:  
**JOHN WALES & CO.,**  
239 & 241 Franklin St., Boston, Mass.  
WESTERN AGENT:  
S. E. BLISS, 89 Lake St., Chicago, Ill.

**THE GIANT PAD LOCK.**  
Manufactured by  
**THE SMITH & EGGE MFG. CO.**  
(Centennial Award.)  
"Superior in Every Respect."  
This is one of the best selling Locks in the market, and affords the dealer a large profit. It is thoroughly and strongly made-of the best material-very handsome in appearance, and every Lock is warranted. Orders solicited. Address as above.  
Lock Box 1705, Bridgeport, Conn.  
AGENTS:  
FLAGLER FORSYTH & BRADLEY 290 Broadway N. Y.

**MAST, FOOS & CO.**  
Springfield, O.  
NEW STYLE  
**BUCK EYE  
FORCE  
PUMP.**  
Works easy, throws a constant stream.  
Has Porcelain Lined and Brass Cylinders.  
Is easily set. Is the Cheapest and Best Force Pump in the world for Deep or Shallow Wells.  
Thousands in use in every part of the United States. Never freezes in winter. Send for CIRCULAR and PRICES, giving depth of well, to  
**MAST, FOOS & CO.,**  
Springfield, Ohio.

**GEO. N. PIERCE & CO.,**  
BUFFALO, N. Y.,  
New York Office, 193 Water Street.  
MANUFACTURERS OF  
**BIRD CAGES and REFRIGERATORS.**  
Send for Illustrated Catalogue and Price Lists.

ALSO FOR SALE BY  
Chicago Stamping Co., Chicago, Ill.  
Sickles, Preston & Co., Dayton, Ohio.  
Cincinnati Tin and Japan Co., Cincinnati, Ohio.  
Kennedy, Spaulding & Co., Syracuse, N. Y.  
Weaver & Goss, Rochester, N. Y.  
E. A. Burrows & Co., Troy, N. Y.

**THE FALLS RIVER  
IRON  
RIVETS**  
MANUFACTURERS OF  
**NORWAY IRON RIVETS  
AND BURRS,**  
AND ALL SIZES OF  
**WROUGHT IRON WASHERS.**  
GENERAL NEW ENGLAND AGENTS:  
**JOHN WALES & CO.,**  
239 & 241 Franklin St., Boston, Mass.  
WESTERN AGENT:  
S. E. BLISS, 89 Lake St., Chicago, Ill.

**BOILERS**  
FREE BOOK SENT TO ANY ADDRESS  
By JAS. F. HOTCHKISS 84 John St. N.Y.



# THE IMPROVED CUMMER AUTOMATIC ENGINE.



WE BUILD FIVE CLASSES OF ENGINES.  
No Steam-Engine Establishment in the U. S. is as well equipped as ours for doing first-class work.  
Send for Catalogue No. 5. Please mention this paper.  
THE CUMMER ENGINE COMPANY, Cleveland, O.  
Hill, Clarke & Co., Boston, Mass.,  
Eastern Agents.



# BARB WIRE MACHINERY.

We have made the Inventing and Manufacturing of this class of Machinery

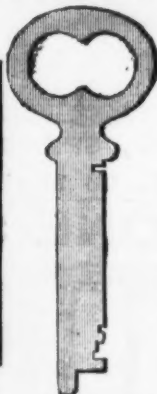
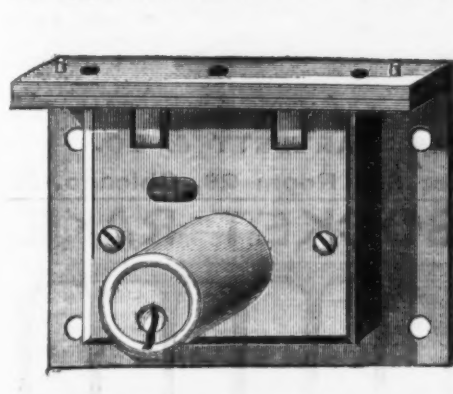
## A SPECIALTY

for eight years, and have the Largest and Best Facilities of any Manufactory in the country.

Will be pleased to give Estimates on receipt of Sample Barb.

**STOVER MFG. CO.,**  
FREEPORT, ILL.

# THE CHARLES PARKER CO.,



MERIDEN,  
CONN.,  
Manufacturers of  
**CABINET  
LOCKS.**

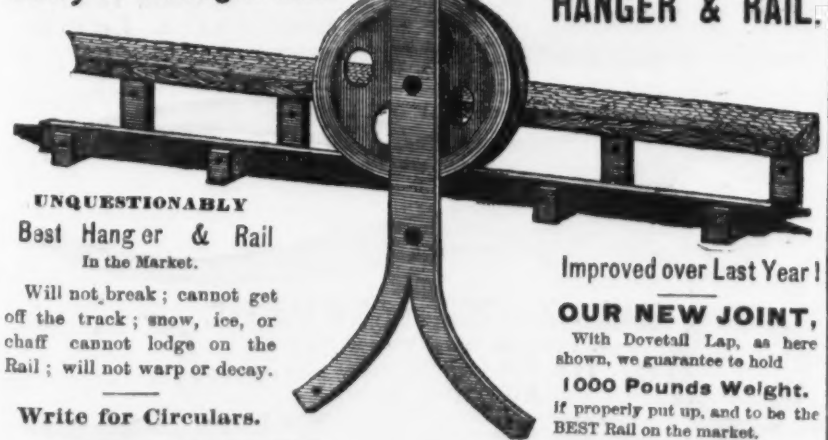
**PHILADELPHIA SCREW CO., Limited,**  
Twelfth and Buttonwood Streets, PHILADELPHIA.



## IRON & BRASS WOOD SCREWS.

Quality, finish and tests as to strength guaranteed equal to any in the market.  
With improved facilities and largely increased capacity for production, we can fill orders promptly, and invite inquiries for discounts. A full line in stock.

# Terry's Wrought Iron



## BARN DOOR HANGER & RAIL.

UNQUESTIONABLY  
Best Hanger & Rail  
in the Market.

Will not break; cannot get off the track; snow, ice, or chaff cannot lodge on the Rail; will not warp or decay.

Write for Circulars.

Improved over Last Year!

OUR NEW JOINT,  
With Dovetail Lap, as here shown, we guarantee to hold 1000 Pounds Weight.  
If properly put up, and to be the BEST Rail on the market.

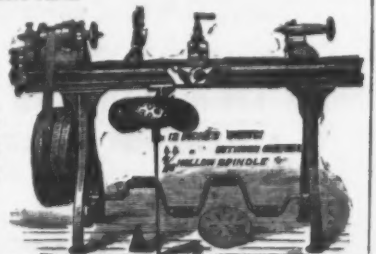
**TERRY MFG. CO.,**

HORSEHEADS, N. Y.

# Barnes' Patent Foot & Steam Power Machinery.



Complete outfits for Actual Workshop Business. Lathes for Wood or Metal. Circular Saws, Scroll Saws, Formers, Mortisers, Tenoners, &c. &c. Machines on trial if desired. Descriptive CATALOGUE AND PRICE LIST FREE.



FOR BUSINESS IN THE WORKSHOP.

Read what our Customers say:

O. C. HILL, M. E., BLACKFOOT, IDAHO:—"I sat at the lathe steadily for 12 hours, cutting off and threading 1 1/2 steam pipes. Those who saw the work declared it equal to a 12-hour job in a machine shop. Taken with special regard to the velocipedes foot motion, I consider the lathe without an equal." Address

**W. F. & JOHN BARNES,**

No. 100 Main Street, Rockford, Ill.



**RIEHLÉ BROS.**  
STANDARD  
**SCALES**  
AND  
TESTING  
MACHINES

PHILADELPHIA,  
4th St., ab. Chestnut.  
NEW YORK,  
115 Liberty Street.  
ST. LOUIS,  
609 North Third St.  
NEW ORLEANS,  
142 Gravier Street.



**RICHARDSON'S  
CELEBRATED**



# S A W S

have justly obtained an enviable reputation. We make a full line of Hand, Panel, Rip, Butchers', Back, Compass, Circular, Mill and Cross-Cut Saws. Special Saws or any Saws not in our list made to order. Illustrated Catalogue on application.

# RICHARDSON'S ONE OR TWO MAN CROSS-CUT SAW

WITH PATENT ADJUSTABLE HANDLE.

The Improved Handle can be used upright at either end of the Saw, or inclined in either direction

Richardson's Hand Saws are unequalled for Temper and Workmanship. Taper Ground. Thin at back. Perfectly true. We are also putting our Red Frame Wood Saws half-dozen in box, or put together, complete, in ordinary state, which way wanted. The finest in the market.



SEND FOR CIRCULAR AND PRICE LIST.

**RICHARDSON BROS.,**

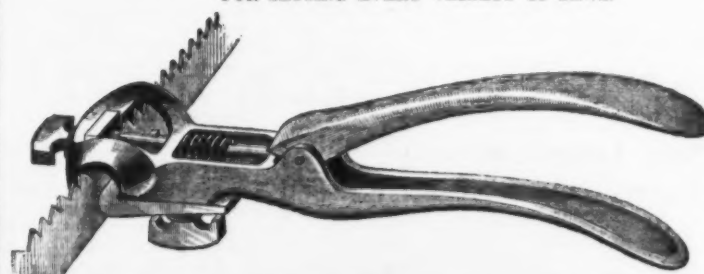
15 to 27 River St., Newark, N. J.,

U. S. A.

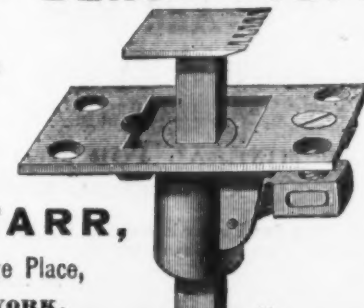


# MORRILL'S PERFECT SAW SETS AND BENCH STOP.

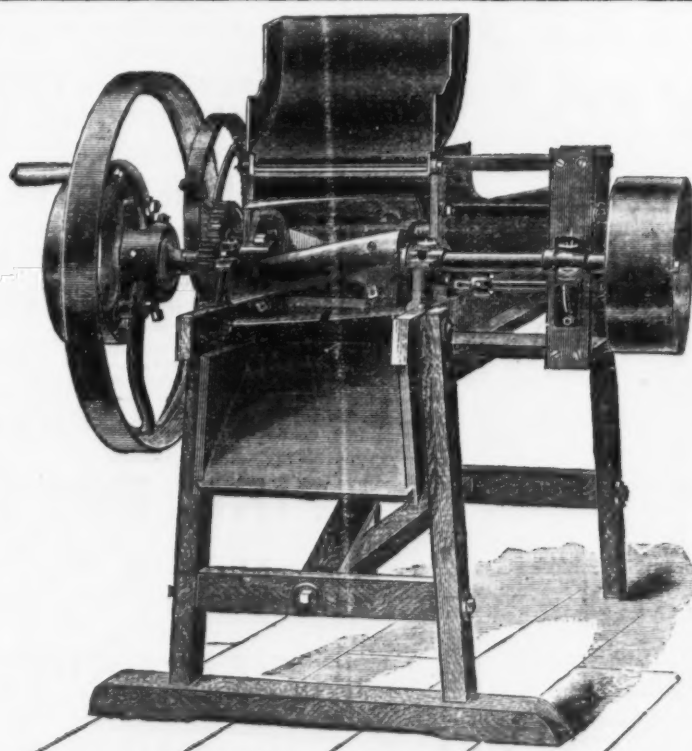
FOR SETTING EVERY VARIETY OF SAWS.



For price lists  
and discounts  
Address



**ASA FARR,**  
64 College Place,  
NEW YORK.



## ROSS LITTLE GIANT No 13.

ROSS ENSILAGE AND FODDER CUTTERS, Giants and Little Giants.

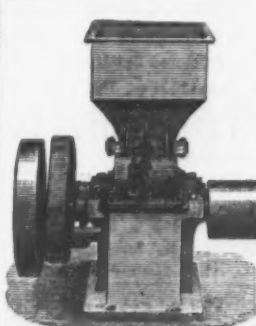
THE VERY BEST CUTTERS IN THE MARKET.

GUARANTEED TO GIVE PERFECT SATISFACTION.

Our 1883 Cutters are the finest we have ever produced. A liberal discount to the trade. Write for prices and illustrated circular.

**E. W. ROSS & CO.,** Fulton, Oswego Co., N. Y.

Mention The Iron Age.



NEWELL'S

# UNIVERSAL MILL.

Pulverizes everything—hard, soft, sticky, and gummy. Grain, Drugs, Chemicals, Clay, Guano, Cotton Seed, Bark, &c. &c. A wonderful machine for grinding Corn, Oats, Feed, &c. Also Steam Engines, Boilers, &c., at lowest rates. Send for circular.

10 BARCLAY STREET,  
NEW YORK.

**RIVETS, BOILER, TANK AND BRIDGE.**  
STANDARD RIVET CO., Cleveland, Ohio.

# DIXON'S SILICA Graphite Paint.

Before painting either Wood or Metal Surfaces, Roofs, Buildings, Bridges, etc., etc., examine the merits of this Paint.

**JOS. DIXON CRUCIBLE CO.**  
Jersey City, N. J., U. S. A.



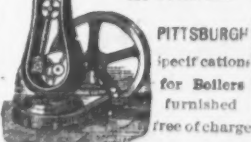
# VULCAN BOILER WORKS.

**JAMES McNEIL & BRO.,**

MANUFACTURERS OF  
BOILERS, SHEET IRON, ROLLING MILL  
AND BLAST FURNACE WORK  
Of all kinds.

Vertical Boilers and Engines a Special-  
ty. Repairing Done Promptly.

29th Street and  
A. V. R. R.



PITTSBURGH  
specifications  
for Boilers  
furnished  
free of charge

# Dynamite, Nitro Glycerine, BLASTING MATERIALS.

Contracts Taken for Clearing Lands of Stumps.

**THE HERCULES POWDER COMPANY**  
Cincinnati, Ohio.







\_\_\_\_\_

[illegible]



**HERMANN BOKER & CO.,**  
101 and 103 Duane Street, New York,

Dryer, s Patent Am'n.....	ass't- cans, cc ; ke
Frostings.....	10

[illegible]

2 1/2 x 25 to 24 x 25	17.50	17.75	15.00	
2 1/2 x 25 to 24 x 26	18.00	18.00	15.00	
2 1/2 x 25 to 24 x 28	18.75	17.75	14.50	
2 1/2 x 25 to 24 x 30	20.50	19.50	15.50	
2 1/2 x 25 to 24 x 32	22.75	21.00	16.50	
2 1/2 x 25 to 24 x 34	24.00	22.00	16.75	
2 1/2 x 25 to 24 x 36	25.25	23.75	17.50	
2 1/2 x 25 to 24 x 38	26.00	24.00	18.25	

Double Throat				
SIZES.	Int.	ext.	yd.	4th
6 x 5 to 12 to 24 x 15	\$11.00	\$12.25	\$11.75	71.00
11 x 12 to 24 x 24	15.75	14.75	14.00	
15 x 22 to 24 x 28	20.00	18.50	17.00	
15 x 28 to 24 x 30	22.00	20.50	17.75	
15 x 30 to 24 x 32	23.00	22.00	18.25	
15 x 32 to 24 x 34	24.00	23.00	18.50	
15 x 34 to 30 x 36	27.00	25.25	22.00	
15 x 36 to 30 x 38	30.00	28.00	24.50	
15 x 38 to 30 x 40	31.50	29.00	25.25	
15 x 40 to 31 x 42	33.00	31.50	26.50	
15 x 42 to 31 x 44	34.00	32.00	27.00	

Sizes above—\$15 per box extra for every 4 inches.

An additional 10 per cent. will be charged for all sizes more than 40 inches wide. All sizes above 40 inches in length and not making more than 40 united inches will be charged in the 34 united inches bracket.

Discount, 70 to 70 and 3.

2 1/2 x 25 to 24 x 25	17.50	17.75	15.00	
2 1/2 x 25 to 24 x 26	18.00	18.00	15.00	
2 1/2 x 25 to 24 x 28	18.75	17.75	14.50	
2 1/2 x 25 to 24 x 30	20.50	19.50	15.50	
2 1/2 x 25 to 24 x 32	22.75	21.00	16.50	
2 1/2 x 25 to 24 x 34	24.00	22.00	16.75	
2 1/2 x 25 to 24 x 36	25.25	23.75	17.50	
2 1/2 x 25 to 24 x 38	26.00	24.00	18.25	

Double Throat				
SIZES.	Int.	ext.	yd.	4th
6 x 5 to 12 to 24 x 15	\$11.00	\$12.25	\$11.75	71.00
11 x 12 to 24 x 24	15.75	14.75	14.00	
15 x 22 to 24 x 28	20.00	18.50	17.00	
15 x 28 to 24 x 30	22.00	20.50	17.75	
15 x 30 to 24 x 32	23.00	22.00	18.25	
15 x 32 to 24 x 34	24.00	23.00	18.50	
15 x 34 to 30 x 36	27.00	25.25	22.00	
15 x 36 to 30 x 38	30.00	28.00	24.50	
15 x 38 to 30 x 40	31.50	29.00	25.25	
15 x 40 to 31 x 42	33.00	31.50	26.50	
15 x 42 to 31 x 44	34.00	32.00	27.00	

Sizes above—\$15 per box extra for every 4 inches.

An additional 10 per cent. will be charged for all sizes more than 40 inches wide. All sizes above 40 inches in length and not making more than 40 united inches will be charged in the 34 united inches bracket.

Discount, 70 to 70 and 3.


**REEL.**

**The Best**

**in the World.**




Write for  
 Price  
 List and  
 discounts  
 to



R. T. WHELPLEY,  
 31 & 133 Lake Street. CHICAGO, ILL.

**NORWAY IRON**  
KINGSTON  
TINNERS AND ALL  
ALL LENGTHS & STYLES.  
7/16 IN. DIAM. & SMALLER.



INTERCHANGEABLE  
LOCK-CORNER SHELF BOXES.  
Screw Cases, &c.,  
FOR THE HARDWARE TRADE.  
S. H. GREEN  
19 Murray St., New York.

WOODRUFF'S PATENT CELEBRATED AMERICAN SUSPENDERS  
 CONDUCTOR'S HOOKS  
 THE CELEBRATED AMERICAN SUSPENDERS  
 HANGER  
 BY  
 GEO. W. HEARTLEY  
 297 ST. CLAIR ST.  
 TOLEDO, OHIO  
 PULLERS FOR WHISTING  
 RINGING  
 SAVING THE SHOULDER  
 SAVING THE SHOULDER  
 SAVING THE SHOULDER

THE WOODRUFF'S PATENT CELEBRATED AMERICAN SUSPENDING HANGERS ARE THE BEST IN THE WORLD. Manufactured by GEO. W. HEARTLEY, 301 St. Clair St., Toledo, Ohio. Send for prices.

**CHARLES H. BESLY & CO.,**  
Manufacturers and Machinists,  
**HARDWARE,**  
**FINE TOOLS.**  
175 Lake St.,  
CHICAGO.

**SEAMLESS TUBES**  
Copper, Brass and Zinc  
PIPE, BRASS, WIRE, ETC., ETC.  
**HAS. H. BESLY & CO.,**  
75 Lake St., Chicago, Ill.  
Send for Illustrated Catalogue



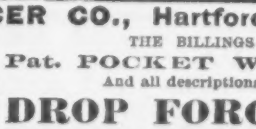





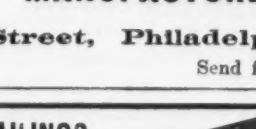
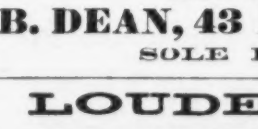

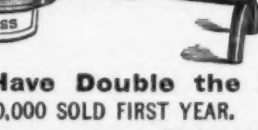
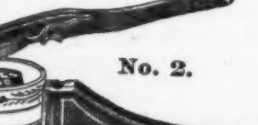
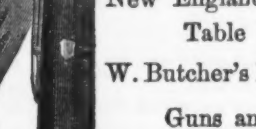
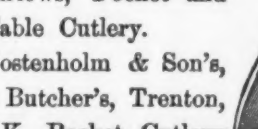
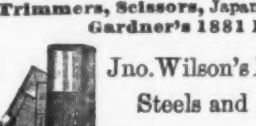
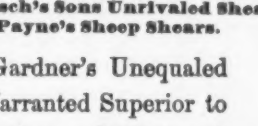



**FOUNDRYMEN'S METALLIC**  
**Pattern Letters and Figures,**  
put on patterns of castings. All sizes, Red  
and colors. Mould by H. W. Knight. Savers' Falls, N. Y.


**PICKS, MATTOCKS, GRUB HOES, HAMMERS.**

**WROUGHT IRON STEEL FACE**

**(P. W. PATTERN.)**

**"FULLY WARRANTED."**




<p>J. W. Gardner's Unequaled and "Warranted Superior to All" Barlows, Pocket and Table Cutlery.</p> <p>Geo. Wostenholm &amp; Son's, Wade &amp; Butcher's, Trenton, and O. K. Pocket Cutlery and Razors.</p>		<p>Jno. Wilson's Butcher Knives, Steels and Shoe Knives, New England Cutlery Co.'s Table Cutlery, W. Butcher's Files and Tools.</p> <p>Guns and Pistols, Arms and Ammunition.</p>
---	---	---

No. 1, 2 and 3.  
 Patented Feb. 7, 1882.

No. 2.

No. 3.


**LOUDERBACK'S**  
**NEW AND PERFECT WINDOW SCREEN,**  
**ADJUSTABLE OR STATIONARY.**



**Edwin Louderback & Co.,**  
**MANUFACTURERS,**  
**13 and 415 S. 5th Street, Philadelphia, Pa.**  
 Liberal Discounts to the Trade. Send for Price List.

**THE COLT DISC ENGINE.**  
*The Best and most Economical High Speed Engine made.*  
**WILL OUTWEAR ALL OTHERS.**  
SPECIALLY SUITABLE FOR DYNAMO ELECTRIC MACHINES

No Dead Centre,  
 and will Start in any  
 Position.



WRITE FOR  
 TESTIMONIALS.

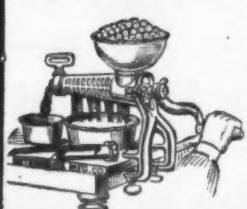

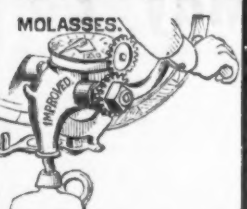
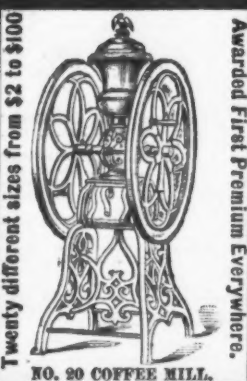

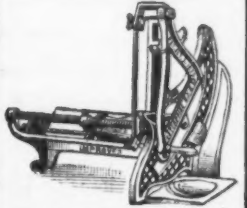
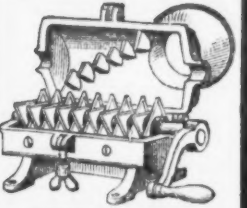

WRITE FOR  
 CATALOGUE.

THE BILLINGS & SPENCER CO., Hartford, Ct.

THE BILLINGS  
**Pat. POCKET WRENCH**  
And all descriptions of  
**DROP FORGINGS**  
for Guns, Pistols, Rewing Machines, and Machinery generally. Send for Catalogue.

10



 Fruit, Wine & Jelly Press.	 SAUSAGE STUFFER.	 MOLASSES Self-Measuring Faucet.
 No. 20 COFFEE MILL.	<b>ENTERPRISE MANUFACTURING CO. OF PA.,</b> THIRD & DAUPHIN STS, PHILADELPHIA, PA.	
	 MRS. POTTS' Cold Handle Double Pointed Sad Irons.	
 Smoked Beef Shaver.	 SAUSAGE CUTTER.	 Tobacco & Root Cutter.

Twenty different sizes from \$2 to \$100  
Awarded First Premium Everywhere.

Tincture Presses,  
Self-Weighing  
Cheese Knife,  
Cork Presses.

THE BEST  
ARE THE  
CHEAPEST.

SOLD BY HARDWARE DEALERS.  
SEND FOR ILLUSTRATED CATALOGUE, FREE.

## THE STANLEY WORKS,

MANUFACTURERS OF

# Wrought Iron Butts, Hinges

AND

## DOOR BOLTS,

Plain, Japanned, Bronzed and Plated.

FACTORIES:                      WAREHOUSE:

New Britain, Connecticut.      79 Chambers St., New York.

## Bemis & Call Hardware & Tool Co.



### PATENT COMBINATION WRENCH.

These Wrenches are made from the best of Wrought Iron, with Steel Head and Jaw, case-hardened throughout, and not only combine all of the superior qualities of our Cylinder or Gas Pipe Wrenches, but also all requisite combinations of a regular Nut Wrench thus making a combination which has no equal.

For Circulars and Price List, address

**BEMIS & CALL HARDWARE & TOOL COMPANY, Springfield, Mass.**



## PRENTISS' PAT. VISES,

Adjustable Jaw.

Stationary or Pat. Swivel Bottoms,  
ADAPTED TO ALL KINDS OF VISE WORK. ALSO  
"PEERLESS" SWIVEL PIPE GRIP,  
FITS ANY VISE. SOLD BY THE TRADE.

**PRENTISS VISE CO.,**  
23 Day Street, New York.  
SOLE PROPRIETORS. SEND FOR CIRCULAR.



**BUY**  
**COVERT'S ROPE**  
**HALTERS,**  
Horse and Cattle Ties,  
**HALTER LEADS,**  
Weight Cords,  
**HITCHING CORDS,**  
Lariat Tethers and  
Picket Pins, &c.  
Sold by all leading Job-  
bers in General and Sad-  
dlery Hardware.  
**COVERT MFG. CO.,**  
West Troy, N. Y.

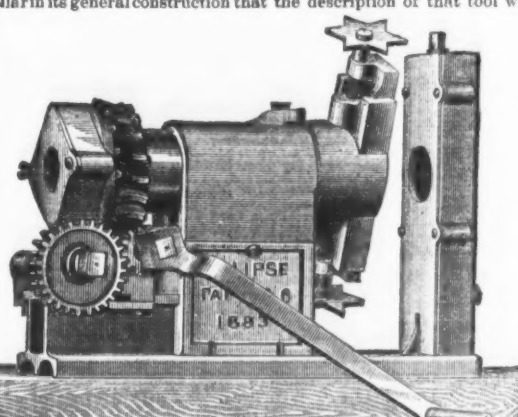
**BUY**  
**COVERT'S HARNESS**  
**SNAPS,**  
Open Eye Bit and  
Chain Snaps,  
**SNAPS AND THIMBLES**  
For Horse and Cattle Ties.  
**BREAST CHAINS,**  
Halter Chains, Rein Chains,  
**POST CHAINS, &c.**  
Sold by all leading Jobbers in  
General and Saddlery Hard-  
ware, at factory prices.  
**COVERT MFG. CO.,**  
West Troy, N. Y.

## "Junior" Eclipse Pipe-Cutting Machine

This Tool possesses all the advantages of the larger size "Eclipse" Machine, and is so similar in its general construction that the description of that tool will serve for the "Junior" also. It meets the requirements of those who have use for a screwing Machine light enough to be readily carried about, sufficiently powerful in its gearing (18 to 1) to work easily, and strong enough to bear rough usage. All of these points, with the very important one of MODERATE COST, are to be found in the "Junior" Eclipse Machine.

It will cut off and thread Pipes from 1/4 to 2-inch, inclusive; can be erected on any fence, box or plank in five minutes by simply boring two 3/4 holes, and weighing complete, about 125 pounds. It has no complicated parts and nothing to break or get out of order, and will do the work of a tool costing twice its price.

We offer it, as also the large size "Eclipse" (cutting pipes 2 1/2 to 4 inch), with the understanding that if not found satisfactory after a fair trial it may be returned to us within thirty days and the purchase money will be refunded.



PRICE, Complete with Dies  
1-4 to 2 inches, \$60.

## PANCOAST & MAULE,

243 & 245 So. Third St.,  
PHILADELPHIA.

## MELLERT FOUNDRY & MACHINE CO., LIMITED.

(Works Established at Reading, Pa., in 1843.)  
MANUFACTURERS OF

## CAST IRON GAS & WATER PIPE

Also Flange Pipe, for Steam or Water, of all sizes used. Special Castings, such as Branches, Bends, Reducers, Sleeves, &c. Stop Valves, Fire Hydrants, Retorts, Lamp Posts, &c.

### The Improved Canada Turbine Water Wheel.

MACHINERY AND CASTINGS FOR  
Furnaces, Rolling Mills, Mining Pumps, Hoists, &c.  
CAR CASTINGS, GIRDERS, COLUMNS, BRACKETS, IRON RAILING, &c., &c.  
GENERAL OFFICE AT READING, PA.



## ROOF CRESTING AND FINIALS,

Weather Vanes, Tower Ornaments, &c.

## WROUGHT IRON FENCES,

Iron Shutters, Window Guards, Jail Work, &c.,  
BANK AND OFFICE RAILINGS,  
WIRE AND IRON WORK of Every Description.

## THE E. T. BARNUM WIRE & IRON WORKS,

Detroit, Mich., U. S. A.

## Henderson's Patent Refractory Compounds.

### THE SILICA BRICK OR COMPOUND.

This compound is adapted to all uses to which silica and fire-clay brick are used. Its advantages are: Production below cost of common red brick for labor and materials; neither expands nor contracts from molding to highest temperature. Infusibility at any temperatures used in the arts. Self-baking or burned in the use. Can be made in any locality where sand is obtainable. No outlay of capital for apparatus. Made by unskilled labor at place where used. May be used in bulk by ramming behind a core, or molded into brick. Repairs are made by patching the fire-worn surface with the same compound. Is adapted for molding steel castings.

### THE LIME OR MAGNESIAN LIME COMPOUND.

This possesses all of the above advantages, with the addition of being better adapted for silver and lead smelting furnaces, iron and steel converting furnaces, and other uses where greater wear or chemical changes are produced by use of silica, and of being made in localities where sand is not obtainable, and of being below cost of red brick for labor and material.

For particulars as to manufacture and licenses, apply to

**JAMES HENDERSON, Agent, Bellefonte, Centre Co., Penn.**

## THE CLARK MFG CO. BUILDERS' HARDWARE

BUFFALO, N. Y.

**CHAMPION HOG RINGER**  
RINGS AND HOLDER.  
Only double ring ever invented. The only ring that will effectively keep Hogs from rooting. No sharp points in the nose.

**EAGLE HILL CORN HUSKER**  
Is the best Husker in the market. Farmers say it is the best. Use no other.

**BROWN'S HOG AND PIG RINGER AND RINGS.**  
Only single Ring in the market that closes on the outside of the nose. No sharp points in the nose to keep it sore.

Ringers, 75c. Rings, 50c. 100. Holders, 75c. Huskers, 15c.  
CHAMBERS, HERRING & QUINLAN, Exclusive Manufacturers, Decatur, Ill.

## EDMUND D. SMITH,

147 So. 4th St., Philadelphia,  
BROKER FOR THE SALE OF ALL GRADES  
FOREIGN AND DOMESTIC  
IRON ORES,  
Spiegeleisen, Pig Iron  
AND STRUCTURAL IRON.

References by Special Permission:

Messrs. C. & H. Borie, Bankers, Philadelphia; Pennsylvania Steel Co.; Crane Iron Co.; Phoenix Iron Co.; Cambria Iron Co.; Franklin B. Gowen, Esq.; Prest P. & R. R. Co.; Geo. M. Troutman, Esq.; Central National Bank, Philadelphia; Phoenix National Bank, New York; Eugene Dutth, Esq., President; Continental National Bank, Edmund S. Randolph, Esq., President; Messrs. Graff, Bennett & Co., Pittsburgh; S. Decatur Smith, Esq., Iron Founder, Philadelphia.

## PATENTS.

Experienced in soliciting United States and Foreign Patents prior and subsequent to service in United States Patent Office. Personal attention to every case from beginning to end. Practical and theoretical knowledge of the mechanic arts. Prompt and skillful prosecution of applications for Patents, Designs, Trade-Marks and Labels. Expert Searches and Opinions as to scope, validity and infringement. Representatives in over thirty foreign countries. Terms reasonable, and always agreed upon before any expense is incurred. Send for circular.

**E. B. STOCKING,**  
Attorney-at-Law,  
Opp. Patent Office, WASHINGTON, D. C.

## PERFECTION WINDOW CLEANER.



Simple, Useful & Durable.

Saves 75 per cent. in time and labor over any other method.

This is the only perfect Glass and Window Cleaner yet devised. It has

## TWO RUBBER STRIPS,

One an elastic cleaning edge, the other a yielding cushion or support. Has hollow iron handles to attach to pole.

We own all the Patents embracing any or all of these principles, and shall prosecute parties found infringing, either by manufacture or sale of any other Rubber Window Cleaner.

Buy only the PERFECTION, and you escape all infringements. See that our stamp and dates of patents are on every cleaner.

## PERFECTION WINDOW CLEANER CO.,

232 La Salle St., CHICAGO, ILL.

## UNION BOLT AND NUT WORKS.

THOMAS PARKES,  
MANUFACTURER OF  
MACHINE BOLTS, NUTS AND RIVETS  
Of All Kinds.  
Office and Works,  
704 206 & 208 Chicago St., BUFFALO, N. Y.

## HAMMOND'S Window Springs

Lock and support upper and lower sashes—all sizes. Are very convenient, simple and durable. Sample to the Trade free.

W. & H. HAMMOND,  
Lewisberry, York Co., Pa.  
Circulars give full instructions.

## Grindstones, Emery, &c.

## Walter R. Wood, GRINDSTONES.

Berea, O., Nova Scotia, & other brands.  
983 and 985 Front Street, New York.

## GEO. CHASE,

The largest manufacturers in the world of

## OIL STONE

Of all description.  
107th Street and Harlem River.  
Send for Illustrated Price List. NEW YORK.

## McDERMOTT & BEEBE STONE CO.

ALL SIZES & GRADES  
SEND FOR PRICES  
MAKERS OF  
GRINDSTONES  
CLEVELAND, O.

## OHIO GRINDSTONE COMPANY

H. H. CLOUGH, Pres. J. M. WORTHINGTON, Secy  
JAMES NICHOLL, V. Pt. E. K. MURPHY, Treas.  
Manufacturers of

## GRINDSTONES

Of All Kinds.  
127 Superior Street,  
CLEVELAND OHIO.











## R. H. WOLFF & CO., STEEL WIRE

MANUFACTURERS OF  
FOR ALL PURPOSES.  
Special Finest CAST STEEL WIRE.  
Market Steel Wire, Prime Coppered Spring Wire, Tempered and Untempered Steel Wires, in Long Lengths, for Crinoline, Corset, Lock and Brush Makers, and all Special Purposes.

ALL KINDS OF FURNITURE SPRINGS.  
IMPORTERS OF  
IRON, STEEL, & RAILS of Every Description.  
Wire Rods, Plain and Galvanized Wires, &c., Gun Barrels, Moulds, and Ordnance.

Shipments in bond from American Ports, and direct from Europe to all parts of the World.  
EXPORTERS AND GENERAL MERCHANTS.  
WORKS, PEEKSKILL, N. Y.

Agents of the ALLIS PATENT STEEL BARBED FENCE



Address,  
Office and Warehouse, 93 John Street, New York.

## MILLER, METCALF & PARKIN, Pittsburgh, Pa.,

Manufacturers of

## CRESCENT STEEL,

In Bars, Sheets, Cold-Rolled Strips, &c.  
Polished, Compressed Drill Rods and Wire.

Warranted equal to any imported in quality, finish and accuracy.

Also Common Grades.

## J. & RILEY CARR,

SOLE IMPORTERS AND MANUFACTURERS OF THE  
CELEBRATED "DOG BRAND"

WARRANTED ALL HAND-CUT FILES AND RASPS,  
PATENT

## BRIGHT COLD ROLLED STEEL,

IN STRIPS, COILS AND SHEETS, AND FOR

SHAFTING, PISTON RODS, &c.

SOLE AGENTS FOR

BAYLISS' Celebrated Forges, Bellows and Tools.

HENRY W. BELCHER, Agent, 30 Gold St., New York.

## S. & C. WARDLOW, Sheffield, England,

Manufacturers of the Celebrated

## Cast and Double Shear STEEL.

In Bars, Sheets and Coils, for fine Pen and Pocket Cutlery, Table Knives, Mining Tools, Dies, Files, Clock and other Springs, and Tools of every variety.

Warehouse, 95 John Street, New York.

WILLIAM BROWN, Representative.

## CLEVELAND ROLLING MILL CO.,

MANUFACTURERS OF

Bessemer Steel and Iron Rail and Fastenings,  
SPRING STEEL AND WIRE OF ALL KINDS,

TIRE, AXLES AND OTHER FORGINGS,  
Roller Plate, Galvanized and Black Sheet Iron, Corrugated Roofing and Siding of Siemens-Martin, Bessemer Steel and Iron.

CLEVELAND, OHIO.

Western Agency, 91 Lake St., CHICAGO. New England Agency, 239 Franklin St., BOSTON.

N. D. PRATT, Agent.

JOHN WALES & CO., Agents.

W. W. SCRANTON,

President.

WALTER SCRANTON,

Vice-President.

E. P. KINGSBURY,

Sec'y and Treas.

## THE SCRANTON STEEL COMPANY,

MANUFACTURERS OF

## STEEL RAILS & BILLETS.

Works at Scranton, Pa.

New York Office, - - - 56 Broadway.

## THE MIDVALE STEEL CO., NICETOWN, PHILADELPHIA.

Best Warranted Cast Steel for Machinists' Tools,

Taps, Dies, Punches, Shear Blades, Chipping Chisels and Granite Rock Drills,  
Extra Mild Center Steel, special for Taps;

ALSO,

MACHINERY AND CAST SPRING STEEL HEAVY AND LIGHT FORGINGS.

Warehouse, No. 12 North 5th St., Philadelphia.

Address A. M. F. Watson, General Sales Agent.

## STEEL Gautier Steel.

See Page 3.

## LABELLE STEEL WORKS.

## SMITH, SUTTON & CO.,

MANUFACTURERS OF ALL KINDS OF

## STEEL.

Also Springs, Axles, Rake Teeth, &c.  
OFFICE & WORKS, Ridge, Lighthill & Belmont Sts., & Ohio River, Allegheny.  
Post Office Address, PITTSBURGH, PA.

Represented at Boston by WETHERELL BROS., 31 Oliver St.; at Philadelphia by JAMES C. HAND & CO., 614 and 616 Market St. at Cleveland by CONNIT, WICK & CO., 19 Water St.

## ALBANY & RENSSLAER IRON & STEEL CO., TROY, N. Y.,

MANUFACTURERS OF

## BESSEMER STEEL RAILS,

FISH PLATES, BOLTS, NUTS, SPIKES, &c.

Machinery Steel, Merchant and Ship Iron.

CHESTER GRISWOLD, Vice-President, - 56 Broadway, New York City.

## BOND, PARSONS & CO.,

104 John St., NEW YORK.

224 So. 3d St., PHILADELPHIA.

AMERICAN AND FOREIGN PIG IRON,

Spiegeleisen, Blooms, Rails, Wire Rods, &c.

TIN PLATES.

VIVIAN, YOUNGER & BOND, London & Birmingham.

## FRANCIS HOBSON & SON,

97 John Street, NEW YORK.

Sole Manufact'rs of "CHOICE" Extra Cast Steel.

Manufacturers of all Descriptions of Steel.

Manufacturers of Every Kind of Steel Wire.

Don Works, Sheffield, England.

CHAS HUGILL, Agent.

"Naylor & Co." (English Cast Steel.)

CLEVELAND CRUCIBLE STEEL CO. (AMERICAN CAST STEEL.)

REPRESENTED BY

TEMPLE & LOCKWOOD, 12 Platt St., New York.

Warranted Superior to any Steel in the Market, either  
English or American, for every purpose.

Also,  
Combination Chrome Steel and Iron for  
Safes, Jails and Deposit Vaults.

Send for Circular  
and  
Price List.

**CHROME CAST STEEL.**

Chrome Steel Works

East Avenue and Keap Street,  
BROOKLYN, E. D., N. Y.

Chicago Branch,  
S. D. KIMBARK, Agent.

Cincinnati Branch,  
N. E. cor. 5th & Main Streets.

## GUTE HOFFNUNG'S HUTTE,

(Works of Good Hope.)

Established 1781.

OBERHAUSEN, ON RUHR.

8500 men employed.

BRAND:

## G. H. H.

STEEL RAILS,

STEEL WIRE RODS,

STEEL BLOOMS,

SPIEGELEISEN,

FERROMANGANESE UP TO 80 PER CENT.

GODEFFROY & CO., Sole Agents for the United States,  
43 New Street NEW YORK.



## CROWN STEEL,

CASSIDY & CO., Mfrs., Pittsburgh, Pa.

WARRANTED EQUAL TO ANY PRODUCED.

Best refined Cast Steel, for Edge and Turning Tools, Taps, Dies, Drills, Punches, Shear Knives,  
Cold Chisels and Machinists' Tools. Also Machinery Steel and Forgings.

HICKS & DICKEY, Con'l Agents, 413 Commerce St. Philadelphia.

Represented in New York by F. L. Froment & Co., 112 John Street.

Represented in Boston by Bellows & Mansion, 77 Oliver Street.

Represented in Atlanta, Ga., by Davenport, Johnson & Co.

## ANDERSON, DU PUY & CO.,

(SUCCESSORS TO ANDERSON & CO.)

Manufacturers of all Descriptions of

Tool,  
Machinery,

## STEEL.

Agricultural,  
&c.

Works and Office at Chartiers Station, P. & L. E. R. R., Branch Office, Cor. Ross & First Ave.,  
PITTSBURGH, PA.

## R. MUSHET'S Special Steel

FOR

## LATHES, PLANERS, &c.

Turns out at least double work by increased speed  
and feed, and cuts harder metals than any other  
steel. Neither hardening nor tempering required.

Sole Makers,

SAMUEL OSBORN & CO.,  
Sheffield, England.

Represented in the United States by

B. M. JONES & CO.,  
Nos. 11 & 13 Oliver Street, BOSTON.

## NAYLOR & CO.,

99 John St., New York.

6 Oliver St., Boston, Mass.

208 S. Fourth St., Philadelphia, Pa.

IMPORTERS OF

STEEL AND IRON RAILS,

Tin and Terne Plates,

Swedish and Norway Iron,

BESSEMER STEEL WIRE RODS.

Pig Iron, Spiegeleisen, Ferroman-  
ganese, Scrap Steel and Old  
Iron Rails.

MANUFACTURERS OF

STEEL COMPRESSED SHAFTING,

"Benzon" Homogeneous Plates

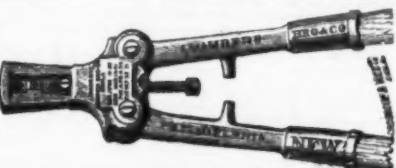
For Boilers, Fire-boxes, &c.

Axles, Crank Pins, Spring Steel,

And all other kinds of

Martin-Siemens Steel and Iron

For Railroad purposes.



## BOLT & RIVET CLIPPERS.

For cutting off the ends of Bolts and Rivets, on  
carriages, wagons, harness, etc. Ask for them  
where you buy your hardware, or send for cir-  
clar and price list.

CHAMBERS, BROTHER & CO.,

82d St., below Lancaster Ave.,  
Philadelphia, Pa.

## THE VERONA TOOL WORKS.

METCALF, PAUL & CO.,

Manufacturers of

Solid Steel Mining and Railroad Picks,

Blacksmith's Sledges, Striking Hammers,

Woodchopper's Wedges and Sledges,

Mining, Quarry and Railroad Tools of the best ma-  
terial and workmanship only. All tools are stamped  
with our name and trade mark, and fully warranted.

Pittsburgh, Pa.

Western Branch

7th Avenue and

CHICAGO, ILL.

Liberty Street.

22 West Lake St.

## F. W. MOSS,

CELEBRATED AND OLD-ESTABLISHED

BRANDS OF

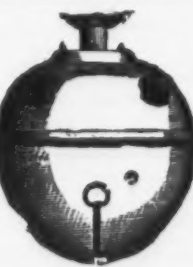
"MOSS" &

"MOSS-GAMBLE'S"

## STEEL AND FILES

Office and Warehouse:

80 JOHN ST., - - New York.



Established 1838.

Bevin Bros. Mfg.

Co.,

Easthampton, Ct.

Manufacturers of

SLEIGH BELLS,

House, Tea, Hand,

Gong Bells, &c.

Bell Metal Kettles.

A. PARDEE, Hazleton, Pa.

J. G. FELL, Phila.

## A. PARDEE & CO.,

237 South Third Street,

PHILADELPHIA,

No. 111 Broadway, New York,

MINERS AND SHIPPERS OF

## Lehigh Coals.

The following superior and well-known Lehigh  
Coals are mined by ourselves and firms connected  
with us, viz.:

A. Pardee & Co.

HAZLETON,

Pardee, Bro. & Co.

CRANBURY,

Calvin Pardee & Co.

SUGAR LOAF.

Pardee, Sons & Co.

LATTIMER.

HOLLYWOOD.

Pardee, Sons & Co. MT. PLEASANT.



# CARNEGIE BROS. & CO., LIMITED,

THOS. M. CARNEGIE,  
Chairman.

PITTSBURGH, PA.

D. A. STEWART,  
Treasurer.

## EDGAR THOMSON STEEL WORKS DEPARTMENT.

Works at Bessemer Station, P. R. R.

Branch Office and P. O. Address, 48 Fifth Ave.,  
MANUFACTURERS OF

### STEEL RAILS, BLOOMS & INGOTS

OF SUPERIOR QUALITY.

## Union Iron Mills Department

Mills at Thirty-third St. and A. V. R. R.

Branch Office and P. O. Address, Thirty-third St.  
MANUFACTURERS OF

### STRUCTURAL IRON.

Bridge Iron, Iron Beams, Channel Bars, Car Truck Channels, Angles, Tees,  
Universal Mill Plates, Bar Iron, Light Steel and Iron Rails.

Special attention given Unusual Shapes and Sizes.

Lithographs of sections and book of detailed information giving calculation of strain, &c., furnished  
to Engineers and Architects on application.

NEW YORK OFFICE: Room 32, No. 55 Broadway, N. Y.

## THE MONTOUR IRON & STEEL COMPANY.

WORKS AT DANVILLE, PA.

### PIG IRON, T AND STREET RAILS.

A general assortment of mine and narrow gauge rails kept on hand from which shipments can be  
made promptly.W. E. G. COXE, President,  
Reading, Pa.S. W. INGERSOLL, Treasurer,  
308 South Fourth St., Philadelphia, Pa.

C. P. LELAND, Pres't. THE CLEVELAND CRUCIBLE STEEL CO., E. M. GRANT, Gen'l Mgr.

TOOL, MACHINERY, STEEL. FILE AND SPRING.  
CLEVELAND, OHIO.BOSTON, JAS. J. KELLY, 18 Kilby Street.  
NEW YORK, TRIMBLE & LOCKWOOD, 12 Platt Street.  
CINCINNATI, JOHN C. EBB & CO., 10 West 3d Street.

## PITTSBURGH BESSEMER STEEL CO. (LIMITED),

# STEEL RAILS

LIGHT RAILS A SPECIALTY.

P. O. Address, 87 Wood Street, Pittsburgh, Pa.

## THOS. FIRTH & SONS, Limited,

SHEFFIELD,

## Crucible Cast Steel.

JERE. ABBOTT &amp; CO.,

AGENTS AND IMPORTERS OF

## SWEDISH IRON,

35 Oliver St., BOSTON.

23 Cliff St., NEW YORK.

W. J. LEWIS, Chairman.

HENRY LLOYD, Secretary.

M. D. W. LOMES, Treasurer.

## LINDEN STEEL COMPANY, LIMITED.

MANUFACTURERS OF

### OPEN-HEARTH STEEL.

Ingots, Blooms, Billets, Slabs, Spring, Tire, Rod, Agricultural and Other Steels.

Correspondence in reference to special shapes, sizes and qualities specially solicited.

Office No. 173 Wood St. PITTSBURGH PA. Works, Linden Station, B. &amp; O. R. R.

## GUSTAF LUNDBERG,

AGENT FOR

N. M. HÖGLUND'S SONS &amp; CO.,

OF STOCKHOLM,

## SWEDISH & NORWAY IRON,

38 KILBY STREET, BOSTON.

ALBERT POTTS, Philadelphia Agent, 234 &amp; 236 N. Front Street.

### EMERY AND

### CORUNDUM

Can be run in WATER, OIL or ACID as well as DRY.

Polishes and Machinists' Supplies.

RUB STONES, EMERY WHEEL MACHINERY

And DIAMOND TOOLS.

CIRCULARS AND PRICE LISTS.

### VITRIFIED WHEEL COMPANY,

WESTFIELD, MASS., U. S. A.

### CHEMICALS AND APPARATUS

FOR THE ANALYSIS OF

ORES, IRON, STEEL, FUEL, FLUXES, FURNACE GASES, &amp;c.,

Our Specialty. Being direct Importers and Manufacturers we can offer superior inducements.

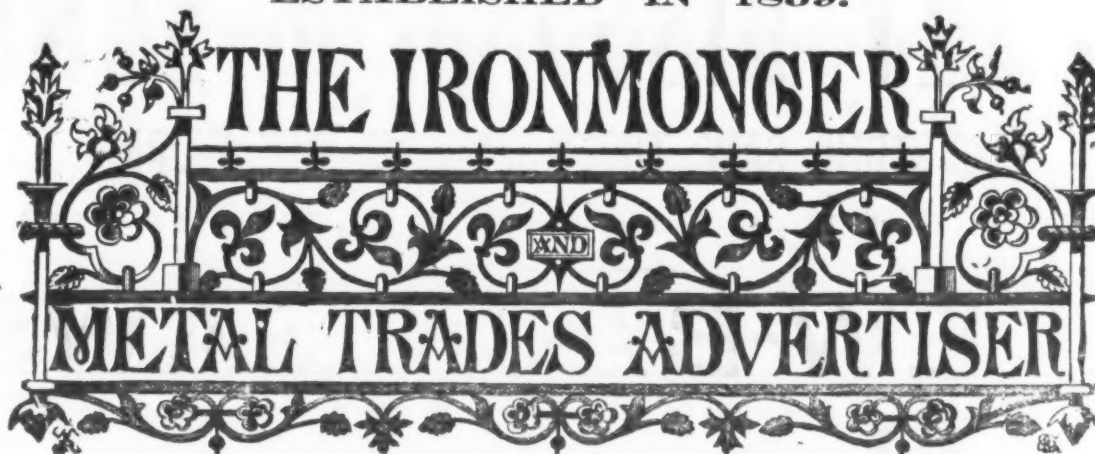
EIMER &amp; AMEND, Nos. 205 to 211 Third Avenue.

NEW YORK.

Eighteenth Street Station Elevated R. R.

Illustrated Catalogue Mailed on Application.

ESTABLISHED IN 1859.



PUBLISHED EVERY SATURDAY.

THE OLDEST AND CHIEF REPRESENTATIVE OF THE IRON, HARDWARE AND METAL TRADES.

OFFICE: 42a CANNON STREET, LONDON, E. C.

ADVERTISEMENTS AND SUBSCRIPTIONS ARE RECEIVED AT THE VARIOUS OFFICES OF "THE IRON AGE," NAMELY:  
NEW YORK OFFICE: DAVID WILLIAMS, Publisher of *The Iron Age*, 83 Reade street, who will, on receipt of application, supply  
specimen copies free.

PITTSBURGH OFFICE: 77 Fourth Avenue—JOS. D. WEEKS.

PHILADELPHIA OFFICE: 230 South Fourth Street—THOMAS

HOBSON, Manager.

CINCINNATI OFFICE: 55 West Fourth Street.

SOUTHERN OFFICE: Cor. Eighth and Market Streets, Chatta-

nooga, Tenn.—S. B. LOWE, manager.

CHICAGO OFFICE: 35 Clark Street, Cor. Lake Street—HENRY SMITH, Manager.

### SPECIAL FEATURES.

Notes of Novelties.—This is a department of the journal always watched with interest by the trade, as it contains an account, from week to  
week, of the novelties which manufacturers and inventors are introducing to the notice of the trade. These articles are freely illustrated.  
Special Correspondents.—The *Ironmonger* has a deserved reputation for its special correspondence from all the principal Continental, British  
and manufacturing centers. The writers are gentlemen holding important positions in the districts with which they are connected, and possess facilities  
for acquiring information specially suited for the columns of the *Ironmonger*. *The Week*, *Legal News*, *Trade Notes*, *Bankruptcies*, *Foreign*  
*Notes*, *Colonial Statistics*, *Merchants' Circulars*, &c., are each departments of the journal containing a digest of all matters of direct interest  
to the Iron, Hardware and Metal Trades. In addition to the above, there is a carefully classified list of Patents, together with Editorial Notes, French,  
Belgian and other Special Correspondence.

### SUBSCRIPTIONS

to the *Ironmonger and Metal Trades' Advertiser*, with which is sent every fourth week the Foreign Supplement (see below), may commence from any  
date, but are not received for less than a year complete. The rate is \$5 per annum, inclusive of postage to any part of the world outside Great Britain.  
To every subscriber is presented, free, in the course of his year, a handsome and useful *Ironmongers' Diary and Text Book*, a work sold to non-  
subscribers at 75 cents.By a mutual clubbing arrangement between the two journals, subscriptions to both will be received by either *The Ironmonger* or *The Iron Age* on  
the following terms:

THE IRONMONGER and THE IRON AGE, Weekly.

In the United States and Canada.....\$7.50 or £1.10s | In Great Britain and Ireland.....\$5.50 or £1.1s | In other countries.....\$8.00 or £1.15s

THE IRONMONGER, Weekly, and THE IRON AGE, Monthly.

In the United States and Canada.....\$5.75 or 25s | In Great Britain and Ireland.....\$3.75 or 15s | In other countries.....\$5.75 or 25s

### ADVERTISEMENTS

are inserted in the *Ironmonger and Metal Trades' Advertiser* at the subjoined rates, from which no variation can be made on any ground whatever.

Size of Page—Nine Inches Deep by Six Inches Wide.

One Advertisement of every Series of 13 Monthly, 27 Fortnightly, or 53 Weekly, will be inserted in  
the *Ironmongers' Diary and Text Book*, published toward the end of each year,  
and presented to every Subscriber.

	53 INSERTIONS, each net.	27 INSERTIONS, each net.	13 INSERTIONS, each net.	7 INSERTIONS, each net.	3 INSERTIONS, each net.	1 INSERTION, net.
One page.....	\$20.00	\$22.50	\$25.00	\$30.00	\$35.00	\$50.00
Two-thirds page.....	15.00	16.90	18.75	22.50	26.25	37.50
Half page.....	11.00	12.40	13.75	16.50	19.25	27.50
One-third page.....	8.00	9.00	10.00	12.00	14.00	20.00
Quarter page.....	6.40	7.25	8.00	9.60	11.20	16.00
One-sixth page.....	4.50	5.10	5.65	6.75	7.75	11.30
One-eighth page.....	3.60	4.10	4.50	5.40	6.25	9.00
One-sixteenth page.....	2.00	2.25	2.50	3.00	3.50	5.00

### SPECIAL ISSUES.

In the spring and autumn of each year there is published a special issue, the circulation of which is not less than Twelve Thousand (12,000) copies.

### THE IRONMONGERS' DIARY AND TEXT BOOK.

This is an annual presented free to every Subscriber to the *IRONMONGER AND METAL TRADES' ADVERTISER*.  
It contains a large number of ruled skeleton pages for diary and other entries, and in addition much useful reference information, varied from year to  
year. It is handsomely bound in cloth, gilt; and as copies are used in thousands of establishments for a whole year, it is obviously a medium of excep-  
tional value for advertisements. Sold to non-subscribers at 75 cents.

## THE FOREIGN SUPPLEMENT,

With which is incorporated The Universal Engineer,

is published every fourth week in connection with the extensive and world-wide circulation of the *Ironmonger* itself. The dates of its publication for the  
next twelve months will be as follows:

MAY 26, JUNE 23, JULY 21, AUGUST 18, SEPTEMBER 15, OCTOBER 13, NOVEMBER 10, DECEMBER 8, 1888, JANUARY 5, FEBRUARY

1, and MARCH 1 and 29, 1889.

This supplement is published in

### FOUR LEADING COMMERCIAL LANGUAGES

of the world, including English, and is sent to all the countries where they are spoken, thus placing the contents of the *Ironmonger* not only with  
reach, but in the native language of eighty millions of German, twenty-eight millions of Italian, and fifty-one millions of Spanish speaking people; or,  
all, over two hundred millions of inhabitants in the principal nations where the best purchasers of manufactured goods are to be found.

Advertisements are inserted in any language at the following

### MODERATE TARIFF.

Size of Page—13½ Inches Deep by 9½ Inches Wide.

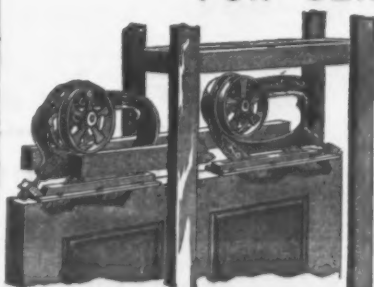
	13 INSERTIONS, each net.	7 INSERTIONS, each net.	3 INSERTIONS, each net.	13 INSERTIONS, each net.	7 INSERTIONS, each net.	3 INSERTIONS, each net.
One page.....	\$30.00	\$33.75	\$37.50	\$10.00	\$11.25	\$12.50
Two-thirds page.....	22.00	24.75	27.50	7.50	8.45	9.40
Half page.....	17.00	19.15	21.25	6.20	7.00	7.75
One-third page.....	12.50	14.10	15.65	3.20	3.40	4.00

Advertisers will do well to use illustrations freely. Where economy of space is an object, a left page illustrated and described in one language  
can be suitably described in four or more languages on the opposite or right page without illustrating.

### THE WHOLE FOREIGN HARDWARE TRADE,

so far as our experience of more than twenty years is concerned, will be covered by THE FOREIGN SUPPLEMENT at least twice a year. Thus a Price List or  
Advertisement inserted in the *Ironmonger* and FOREIGN SUPPLEMENT is a strikingly powerful and most efficient way of publicity, not to be compared with  
any of the other ordinary channels of communication.

## THE RICHARDS HOUSE-DOOR HANGER FOR SLIDING DOORS.

They are simple to hang, massive and strong,  
without a single weak point. Adaptable to all  
widths of doors from two to twelve feet, single  
or double, and require no track on the floor.  
The only absolutely anti-friction top hanger in  
the market. There are no plates to mortise in;  
no matching of hardware, and no defacing of  
doors. The trade are required to carry but one  
size in stock, the run being about forty inches  
longer than the largest sheave upon the market.  
Every set guaranteed. Write for quotations.

MANUFACTURED BY

WILCOX MFG. COMPANY,  
AURORA, ILL.

## THE LOW PATENT FEED WATER HEATER & PURIFIER,

Heating and Puri-  
fying Water for  
Steam Boilers.

Patented July 12, 1877.

Has Straight

Tubes.

SIMPLICITY,

RELIABILITY and

EFFICIENCY

At Less Cost

Than any Other.

Write for prices and

further information to

the manufacturers,

Lowe &amp; Watson

BRIDGEPORT, CONN.

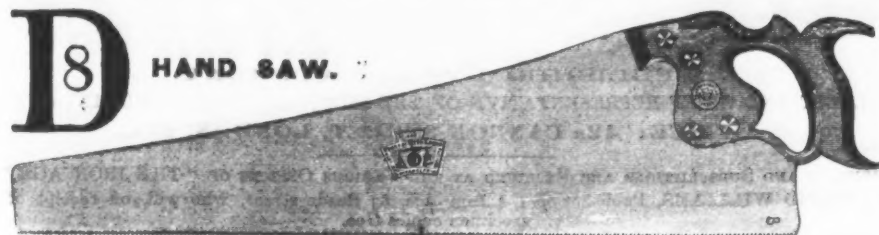


# HENRY DISSTON & SONS,

KEYSTONE SAW, TOOL, STEEL & FILE WORKS,

Front and Laurel Streets, PHILADELPHIA.

## SKEW-BACK SAWS.



This Saw has all the latest improvements in Hand Saws, and is warranted superior to all others, and is giving entire satisfaction.

We call the attention of the trade to our new styles of

**COMMON HAND SAWS,**

the *cheapest* in the market. We are also offering

**SUPERIOR CROSS-CUT SAWS**

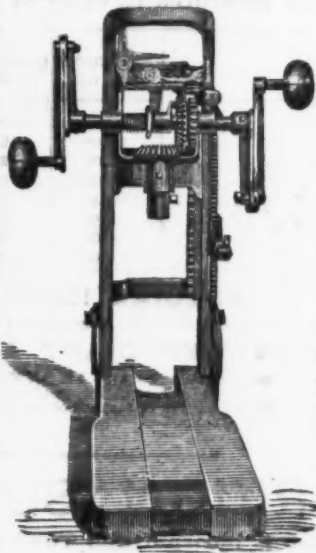
FOR THE FALL TRADE.

Send for Price List.

### SAUNDERS' PATENT AUTOMATIC BORING MACHINES FOR BUILDERS' AND FRAMERS' USE.

are universally acknowledged to be superior to all other Boring Machines, and we guarantee to give better satisfaction than any other machine.

Ship Builders, House Builders, Dock Builders, Bridge Builders, Carpenters and Farmers please notice what we claim for our machine, and we guarantee all that we claim: First, that it will do nearly double the work of any other machine in the same length of time, with greater ease to the operator; that we can regulate the speed of the bit according to the size of the same, or to suit the operator; it will drive the bit any required speed; it will drive the bit or auger to any required depth, and the bit or auger returns from the hole by the same automatic motion without the operator stopping the machine; at the same time clearing itself and leaving the hole entirely free from chips; it is gauged to bore such a depth as may suit the operator, boring two or more holes at exactly the same depth after being once set, without any attention from the operator; it is an angular machine and will bore on any angle; it is the most compact machine; it can be placed in so small a compass as to occupy but little room in a carpenter's tool chest, and while in this compact form it can be carried in the hand with the greatest ease and convenience; it is the most durable machine, from the fact that we use the best material in its construction, and each part can be duplicated in case of accident by sending directly to us. We finish the ironwork with a baked or heated Japan finish, which enables it to withstand all kinds of weather, the woodwork being rubbed in oil and shellac. They are the cheapest Boring Machines in the world for what they can do. We are introducing the Gladwin Improved Auger in connection with this machine. This auger is the best Boring Machine Auger made, being a self-cleaning in gummy or knotty wood. We offer the Borer, boxed and delivered on board cars, for \$6, with full set Gladwin Improved Augers, 18 qrs., \$9; or with extra finished beds, \$6.50, and full set augers, 18 qrs., \$9.50. A discount given for large orders. Send for Descriptive Catalogue.



THE W. B. WELLS MFG. CO., Ashaway, R. I.

LOUDBACK GILBERT & CO., 33 Chambers St., New York, Agents.  
TALLMAN & McFADDEN, 607 Market Street, Philadelphia, Agents.  
BUHL, SONS & CO., Detroit, Mich., Agents.  
A. W. BINGHAM & CO., Cleveland, Ohio, Agents.  
SIMMONS HARDWARE CO., St. Louis, Mo., Agents.  
GORDON HARDWARE CO., San Francisco, Cal., Agents.  
HODGE & HOMER, 47 Randolph Street, Chicago, Ill., Agents.

WILEY & RUSSELL MFG. CO.,  
THE GREEN RIVER TIRE UPSETTER.

Greenfield, Mass.

LIGHTNING

Screw-Cutting Machinery and Tools.

Lightning Screw Plates.  
Lightning Bolt Cutters.  
Green River Tire Upsetters.  
Green River Horse Shoers' Vises.  
Green River Drills.  
Green River Tire Benders.  
Tire Measuring Wheels, &c., &c.  
Taps and Dies for use in Machines.  
Screw Plates, Bit Brace, Drilling Machines, &c.  
Bit Brace Reamers, for Blacksmiths and Carriage Makers.

Send for Illustrated Price List.



### WROUGHT IRON TACKLE BLOCKS.

Swivel Hooks for Rope or Chain,  
POLISHED GROOVES, ALL SIZES IN STOCK.

Also Pulley Blocks for Wire Rope,

Headquarters for the

RVING BRAND WOODEN PULLEY BLOCKS,

McCOY & SANDERS, Manufacturers,

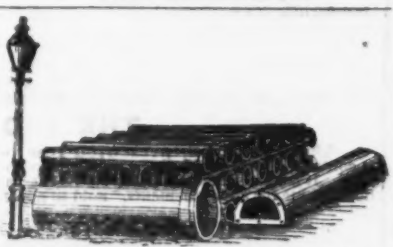
26 Warren Street, New York.



AGENTS IN ALL FOREIGN COUNTRIES.

**HOWSON'S  
PATENT  
OFFICES**

119 South Fourth Street,  
PHILADELPHIA  
Branch Office, 605 Seventh St. Washington, D. C.  
H. HOWSON, Engineer and Builder of Patents.  
G. HOWSON, Attorney at Law and Counsel in Patent Cases.  
SEND FOR CIRCULARS.



R. D. WOOD & CO.,  
Philadelphia,

Manufacturers of

**Cast Iron Pipe**

FOR WATER AND GAS,  
Lamp Posts, Valves, &c.,  
Mathew's Pat. Anti-Freezing Hydrants.  
400 CHESTNUT STREET.

ONONDAGA PATENTED  
ROAD SCRAPER.

The BEST and CHEAPEST in the WORLD. We not only guarantee it a good scraper, but can safely say it has no equal. Price, \$25. Liberal discount to agents. Send for circulars. Address  
F. G. AUSTIN,  
BOX 293, Mankato, Minn., N. Y.

LEVER  
Lemon Squeezer.  
With perforated strainer. It will squeeze one-third more juice from a lemon than any other; also quicker and more durable than any other.  
R. ORDERDONK.

Best, Cheapest and  
Fastest Selling  
POTS  
On the Market.  
Send for discounts.  
R. C. PURVIS,  
407 CHERRY ST.,  
Philadelphia.

MACHINERY FOR  
Straightening and Cutting Wire  
Of all sizes to any length.  
Send for Catalogue.  
JOHN ADT,  
New Haven, Conn., U. S. A.



### Prouty's Patent PEERLESS FORCE PUMP.

Has Self-Adjustable Foot Rest.

NEW AUTOMATIC COMPENSATING  
PACKING.

It will throw a continuous jet FROM  
FORTY TO SIXTY FEET. A new pattern  
jet and spray nozzle is sent with each  
pump.

Especially attention is called to the  
material and workmanship exhibited  
in these pumps.

LIST PRICE, \$8.

THE NEW ENGLAND BUTT CO.  
PROVIDENCE, R. I.

NEW YORK OFFICE, 99 Chambers St.

THE "BUCKEYE" JUNIOR  
LAWN MOWER  
MANUFACTURED BY  
MAST FOOS & CO.  
SPRINGFIELD, O.

SENIOR  
AND  
JUNIOR  
"BUCKEYE"  
LAWN MOWERS.  
FULLY TESTED  
AND PROVED TO BE THE  
MOST RELIABLE  
LAWN MOWERS  
In the Market.  
Try One and You will Buy It.

Send for Illustrated Circulars to  
MAST, FOOS & CO., Springfield, Ohio.

MORSE TWIST DRILL AND MACHINE CO.  
NEW BEDFORD, MASS., Sole Manufacturers of  
Morse Patent Straight-Lip Increase Twist Drill,  
Beach's Patent Self-Centering Chuck, Solid and Shell Reamers,  
BIT STOCK DRILLS,  
DRILLS FOR COES, WORCESTER, HUNTER AND OTHER HAND DRILL  
PRESSES. BEACH'S PATENT SELF-CENTERING CHUCKS, CENTER  
AND ADJUSTABLE DRILL CHUCKS, SOLID AND SHELL REAMERS.  
DRILL GRINDING MACHINES. TAPER REAMERS, MILLING  
CUTTERS AND SPECIAL TOOLS TO ORDER.  
All Tools exact to Whitworth Standard Gauges.  
GEO. R. STETSON, Supr. EDWARD S. TABER, Treas.

BEECHER & PECK  
Successors to Milo Peck, Manufacturers of  
PECK'S DROP PRESS  
PECK'S DROP LIFTER is the only one which has its parts  
cushioned. Being thus cushioned they are the most durable Lifter in  
the market.  
Can be attached to any drop now in use.  
Send for Illustrated Catalogue.  
Cor. Lloyd and River Sts. New Haven, Conn.

MATTHIESSEN & HEGELER ZINC COMPANY,  
LA SALLE, ILLINOIS,  
MANUFACTURERS OF  
Refined Spelter, Sheet Zinc and  
Sulphuric Acid.  
ALL ORDERS FILLED PROMPTLY.

Armstrong's Improved Adjustable Stock and Dies  
FOR PIPE AND BOLTS.  
Tapped to the U. S. and Whitworth Standard Gauges. Adjustable to all variations in the size of  
 fittings. Can be resharpened without drawing the temper by simply grinding them. Possessing prac-  
tical advantages appreciated by all mechanics. Circular and Price List sent free on application.  
Manufactured by F. ARMSTRONG, 30 Sterling St. Bridgeport, Conn.





## PHILADELPHIA.

Corrected Weekly by Lloyd, Supplee & Walton.  
Terms, 30 days. For 60 or 90 days, interest added at 10% per cent. per annum.

**Apples.**  
Perry Wrights, 100 lbs. \$1.15  
Over 200 lbs. \$1.10  
Perry Wrights, 100 lbs. \$1.15  
Over 200 lbs. \$1.10  
Perry Wrights, 100 lbs. \$1.15  
Over 200 lbs. \$1.10

**Apple Pears.**  
Globe Apple Pears, 100 lbs. \$1.15  
Perry Wrights, 100 lbs. \$1.15  
Over 200 lbs. \$1.10

**Apples and Pears.**  
Perry Wrights, 100 lbs. \$1.15  
Over 200 lbs. \$1.10

**Apples and Pears.**  
Perry Wrights, 100 lbs. \$1.15  
Over 200 lbs. \$1.10

**Apples and Pears.**  
Perry Wrights, 100 lbs. \$1.15  
Over 200 lbs. \$1.10

**Apples and Pears.**  
Perry Wrights, 100 lbs. \$1.15  
Over 200 lbs. \$1.10

**Apples and Pears.**  
Perry Wrights, 100 lbs. \$1.15  
Over 200 lbs. \$1.10

**Apples and Pears.**  
Perry Wrights, 100 lbs. \$1.15  
Over 200 lbs. \$1.10

**Apples and Pears.**  
Perry Wrights, 100 lbs. \$1.15  
Over 200 lbs. \$1.10

**Apples and Pears.**  
Perry Wrights, 100 lbs. \$1.15  
Over 200 lbs. \$1.10

**Apples and Pears.**  
Perry Wrights, 100 lbs. \$1.15  
Over 200 lbs. \$1.10

**Apples and Pears.**  
Perry Wrights, 100 lbs. \$1.15  
Over 200 lbs. \$1.10

**Apples and Pears.**  
Perry Wrights, 100 lbs. \$1.15  
Over 200 lbs. \$1.10

**Apples and Pears.**  
Perry Wrights, 100 lbs. \$1.15  
Over 200 lbs. \$1.10

**Apples and Pears.**  
Perry Wrights, 100 lbs. \$1.15  
Over 200 lbs. \$1.10

**Apples and Pears.**  
Perry Wrights, 100 lbs. \$1.15  
Over 200 lbs. \$1.10

**Apples and Pears.**  
Perry Wrights, 100 lbs. \$1.15  
Over 200 lbs. \$1.10

**Apples and Pears.**  
Perry Wrights, 100 lbs. \$1.15  
Over 200 lbs. \$1.10

**Apples and Pears.**  
Perry Wrights, 100 lbs. \$1.15  
Over 200 lbs. \$1.10

**Apples and Pears.**  
Perry Wrights, 100 lbs. \$1.15  
Over 200 lbs. \$1.10

**Apples and Pears.**  
Perry Wrights, 100 lbs. \$1.15  
Over 200 lbs. \$1.10

**Apples and Pears.**  
Perry Wrights, 100 lbs. \$1.15  
Over 200 lbs. \$1.10

**Apples and Pears.**  
Perry Wrights, 100 lbs. \$1.15  
Over 200 lbs. \$1.10

**Apples and Pears.**  
Perry Wrights, 100 lbs. \$1.15  
Over 200 lbs. \$1.10

**Apples and Pears.**  
Perry Wrights, 100 lbs. \$1.15  
Over 200 lbs. \$1.10

**Apples and Pears.**  
Perry Wrights, 100 lbs. \$1.15  
Over 200 lbs. \$1.10

**Apples and Pears.**  
Perry Wrights, 100 lbs. \$1.15  
Over 200 lbs. \$1.10

**Apples and Pears.**  
Perry Wrights, 100 lbs. \$1.15  
Over 200 lbs. \$1.10

**Apples and Pears.**  
Perry Wrights, 100 lbs. \$1.15  
Over 200 lbs. \$1.10

**Apples and Pears.**  
Perry Wrights, 100 lbs. \$1.15  
Over 200 lbs. \$1.10

**Apples and Pears.**  
Perry Wrights, 100 lbs. \$1.15  
Over 200 lbs. \$1.10

**Apples and Pears.**  
Perry Wrights, 100 lbs. \$1.15  
Over 200 lbs. \$1.10

**Apples and Pears.**  
Perry Wrights, 100 lbs. \$1.15  
Over 200 lbs. \$1.10

**Apples and Pears.**  
Perry Wrights, 100 lbs. \$1.15  
Over 200 lbs. \$1.10

**Apples and Pears.**  
Perry Wrights, 100 lbs. \$1.15  
Over 200 lbs. \$1.10

**Round Head Brass, new list Dec. 27.**  
Round Head Brass, new list Dec. 27.

**Round Head Brass, new list Dec. 27.**  
Round Head Brass, new list Dec. 27.

**Round Head Brass, new list Dec. 27.**  
Round Head Brass, new list Dec. 27.

**Round Head Brass, new list Dec. 27.**  
Round Head Brass, new list Dec. 27.

**Round Head Brass, new list Dec. 27.**  
Round Head Brass, new list Dec. 27.

**Round Head Brass, new list Dec. 27.**  
Round Head Brass, new list Dec. 27.

**Round Head Brass, new list Dec. 27.**  
Round Head Brass, new list Dec. 27.

**Round Head Brass, new list Dec. 27.**  
Round Head Brass, new list Dec. 27.

**Round Head Brass, new list Dec. 27.**  
Round Head Brass, new list Dec. 27.

**Round Head Brass, new list Dec. 27.**  
Round Head Brass, new list Dec. 27.

**Round Head Brass, new list Dec. 27.**  
Round Head Brass, new list Dec. 27.

**Round Head Brass, new list Dec. 27.**  
Round Head Brass, new list Dec. 27.

**Round Head Brass, new list Dec. 27.**  
Round Head Brass, new list Dec. 27.

**Round Head Brass, new list Dec. 27.**  
Round Head Brass, new list Dec. 27.

**Round Head Brass, new list Dec. 27.**  
Round Head Brass, new list Dec. 27.

**Round Head Brass, new list Dec. 27.**  
Round Head Brass, new list Dec. 27.

**Round Head Brass, new list Dec. 27.**  
Round Head Brass, new list Dec. 27.

**Round Head Brass, new list Dec. 27.**  
Round Head Brass, new list Dec. 27.

**Round Head Brass, new list Dec. 27.**  
Round Head Brass, new list Dec. 27.

**Round Head Brass, new list Dec. 27.**  
Round Head Brass, new list Dec. 27.

**Round Head Brass, new list Dec. 27.**  
Round Head Brass, new list Dec. 27.

**Round Head Brass, new list Dec. 27.**  
Round Head Brass, new list Dec. 27.

**Round Head Brass, new list Dec. 27.**  
Round Head Brass, new list Dec. 27.

**Round Head Brass, new list Dec. 27.**  
Round Head Brass, new list Dec. 27.

**Round Head Brass, new list Dec. 27.**  
Round Head Brass, new list Dec. 27.

**Round Head Brass, new list Dec. 27.**  
Round Head Brass, new list Dec. 27.

**Round Head Brass, new list Dec. 27.**  
Round Head Brass, new list Dec. 27.

**Round Head Brass, new list Dec. 27.**  
Round Head Brass, new list Dec. 27.

**Round Head Brass, new list Dec. 27.**  
Round Head Brass, new list Dec. 27.

**Round Head Brass, new list Dec. 27.**  
Round Head Brass, new list Dec. 27.

**Round Head Brass, new list Dec. 27.**  
Round Head Brass, new list Dec. 27.

**Round Head Brass, new list Dec. 27.**  
Round Head Brass, new list Dec. 27.

**Round Head Brass, new list Dec. 27.**  
Round Head Brass, new list Dec. 27.

**Round Head Brass, new list Dec. 27.**  
Round Head Brass, new list Dec. 27.

**Round Head Brass, new list Dec. 27.**  
Round Head Brass, new list Dec. 27.

**Round Head Brass, new list Dec. 27.**  
Round Head Brass, new list Dec. 27.

**Round Head Brass, new list Dec. 27.**  
Round Head Brass, new list Dec. 27.

## THE IRON AGE.

Best Quality Refined Cast Steel.

Best Quality Refined Cast Steel.

Best Quality Refined Cast Steel.

Best Quality Refined Cast Steel.

Best Quality Refined Cast Steel.

Best Quality Refined Cast Steel.

Best Quality Refined Cast Steel.

Best Quality Refined Cast Steel.

Best Quality Refined Cast Steel.

Best Quality Refined Cast Steel.

Best Quality Refined Cast Steel.

Best Quality Refined Cast Steel.

Best Quality Refined Cast Steel.

Best Quality Refined Cast Steel.

Best Quality Refined Cast Steel.

Best Quality Refined Cast Steel.

Best Quality Refined Cast Steel.

Best Quality Refined Cast Steel.

Best Quality Refined Cast Steel.

Best Quality Refined Cast Steel.

Best Quality Refined Cast Steel.

Best Quality Refined Cast Steel.

Best Quality Refined Cast Steel.

Best Quality Refined Cast Steel.

Best Quality Refined Cast Steel.

Best Quality Refined Cast Steel.

Best Quality Refined Cast Steel.

Best Quality Refined Cast Steel.

Best Quality Refined Cast Steel.

Best Quality Refined Cast Steel.

Best Quality Refined Cast Steel.

Best Quality Refined Cast Steel.

Best Quality Refined Cast Steel.

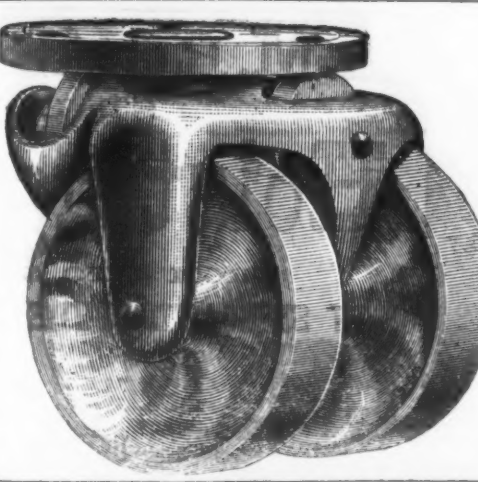
Best Quality Refined Cast Steel.

Best Quality Refined Cast Steel.

Best Quality Refined Cast Steel.

Best Quality Refined Cast Steel.

Best Quality Refined Cast Steel.



## THE YALE CASTER.

A New Caster,

with at least ten distinct improvements over anything of the kind heretofore made.

For Furniture of a kind, Flower Stands, Pianos, Stoves and Warehouse Trucks, and anything that needs a Caster.

Ten Sizes.

Six of the largest sizes now ready and four more sizes will follow soon.

Send for Circular.

YALE CASTER CO.,

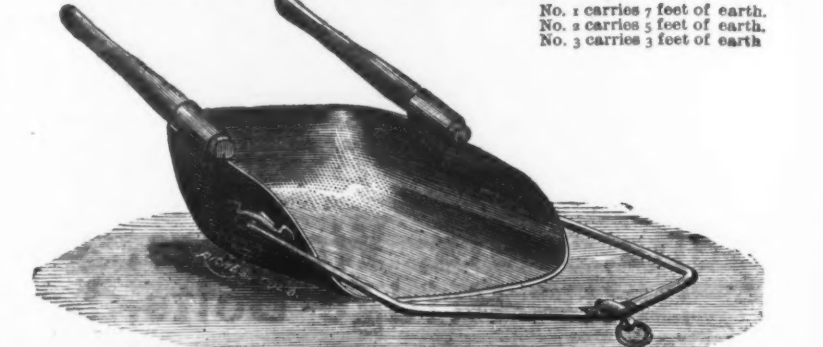
New Haven, Conn.

HENRY B. NEWHALL CO.,

105 Chambers St., New York, Agents.

See Iron Age editorial, March 22.

## THE "COLUMBUS" SOLID STEEL SCRAPER.



No. 1 carries 7 feet of earth. No. 2 carries 5 feet of earth. No. 3 carries 3 feet of earth.

Made from one sheet of Steel, 3-16 of an inch thick, PRESSED into shape. It is without Seam, Joint or Rivet, and is the Lightest, Strongest and most Durable Scraper made.

Fills easier and cleans better than any other, and there is nothing about it to get out of repair. We also manufacture the well-known

DOTY'S AUTOMATIC REVOLVING SCRAPERS

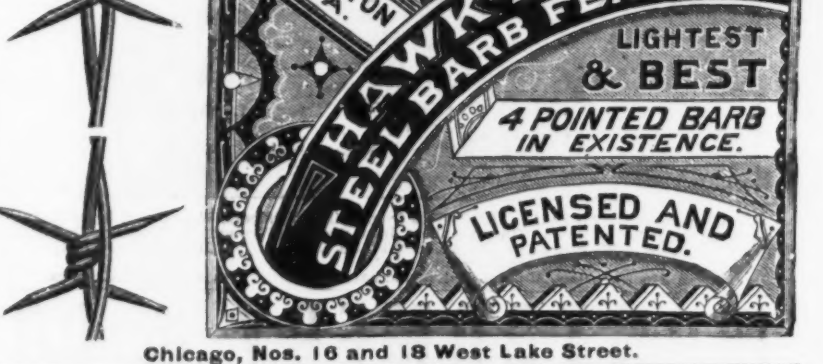
And a full line of

WHEELBARROWS, ROAD PLOWS, &c.

For Prices, Terms &c., address

KILBOURNE & JACOBS MFG. CO., Columbus, Ohio, U. S. A.

THOMPSON McCOSH, President. JOHN A. McCOSH, Sec. and Treas.



Chicago, Nos. 16 and 18 West Lake Street.

## THE SAMSON

is the Best, the Simplest and most Portable

WIRE

STRETCHER

In the Market.

Line of Draft direct; always Self-Adjusting; Rigid Double Handle; Double Pawl; it works at either end of the fence, at either side of the post and either side up.

LIGHT, PORTABLE, SIMPLE, SURE.

For sale by all leading wholesale Jobbing Hardware Houses and Barb Wire men in the United States.

MANUFACTURED ONLY BY

SAMSON NOVELTY WORKS, Nos. 14 & 16 Main St., De Kalb, Ills.

AND IN CANADA BY

BULLOCK HARDWARE CO., Ottaville, Ontario.

## MASTER-KEYED

BRASS PADLOCKS, in sets of any required number,

made to order. Each lock has 2 special keys, which will unlock no other. Each Set has a Master-Key which will open the whole set—a great convenience in all shops and factories. Thousands in use. Satisfaction invariably given.

All who use PADLOCKS FOR SECURITY should examine "Miller's 6-Lever," of which there are now made nearly 20 modifications. The Franklin Institute has awarded to the inventor the John Scott Medal and Premium, for account of the Board of City

Trusts of the City of Philadelphia.

FAIRBANKS & CO., Agents, 311 Broadway, New York,

New Orleans, Pittsburgh, Buffalo, Albany, Philadelphia, Baltimore, &c.

## PHILADELPHIA BLACK LEAD CRUCIBLE WORKS.

1324 to 1334 Callowhill St., Philadelphia, Pa.

BRASS CRUCIBLE.

STEEL CRUCIBLE.

PULVERIZED LUMBER.

R. B. SEIDEL.

Manufacturer of SUPERIOR BLACK LEAD CRUCIBLES.

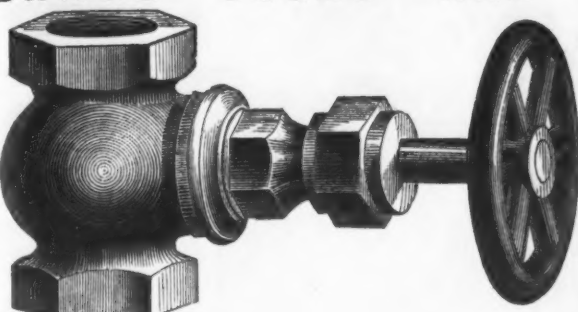
For melting Steel, Brass and other metals. Black Lead Crucibles, for Bessemer Steel Makers. Also manufacturer of superior quality Hammered Charcoal Iron of different sizes and shapes.







**McNab & Harlin Mfg. Co.,**  
MANUFACTURERS OF  
**BRASS COCKS AND VALVES,**  
For STEAM, WATER, and GAS.  
Wrought Iron Pipe and Fittings,  
**PLUMBERS' MATERIALS,**  
Factory, Paterson, N. J. 56 John Street, N. Y.



**BLACK AND TINNED IRON RIVETS.**

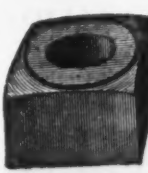
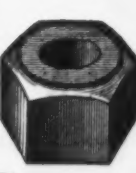


**W. P. TOWNSEND & CO.,**  
PITTSBURGH, PA.,  
Manufacturers of every description of First Quality  
**RIVETS.**  
H. B. NEWHALL CO.,  
105 Chambers St.,  
New York Agents.

**WM. H. HASKELL CO.,**  
Pawtucket, R. I.  
MANUFACTURERS OF  
**COACH SCREWS,**  
(With Gimlet Points),  
ALL KINDS OF  
Machine and Plow Bolts,  
AND  
TAP BOLTS.  
HENRY B. NEWHALL CO.,  
105 Chambers St., New York,  
and 47 Pearl St., Boston,  
(J. H. WORK, Manager),  
EASTERN AGENTS.



**STANDARD NUT CO.,**  
Pittsburgh, Pa.,  
MANUFACTURERS OF  
**HOT PRESSED**  
Square & Hexagon Nuts,  
**R. R. FISH BARS,**  
**BOLTS,**  
**SPIKES,**  
**RIVETS, &c.**  
HENRY B. NEWHALL CO.,  
105 Chambers St., New York,  
and 47 Pearl St., Boston,  
(J. H. WORK, Manager),  
EASTERN AGENTS.

**Philadelphia "STAR" Bolt Works.**  
NORWAY IRON FANCY HEAD BOLTS,  
Carriage & Tire Bolts. Star Axle Clips, &c.  
TOWNSEND, WILSON & HUBBARD, 2301 Cherry Street, Philadelphia, Pa.



**G. W. Bradley's Edge Tools.**  
Butchers' Cleavers,  
Butchers' Choppers,  
Axes and Hatchets,  
Crab Hoes and Mattocks,  
Mill Picks,  
Box Chisels and Scrapers,  
Ring Bush Hooks,  
Ax Eye Bush Hooks,  
Socket Bush Hooks,  
Wait's Ship Carpenters' Tools,  
Carpenters' Drawing Knives,  
Coopers' and Tar-pentine Tools.  
FOR SALE BY  
**MARTIN DOSCHER, Agent, 85 Chambers Street, N. Y.**

**BRONZE BEARINGS.**  
AMERICAN BRONZE WORKS.  
BRONZE AND BRASS BEARINGS  
AND ORNAMENTAL CASTINGS.  
CAR AND LOCOMOTIVE WORK A SPECIALTY.  
28 Columbus Street, Cleveland, O.


**EATON, COLE & BURNHAM CO.,**  
58 John St., NEW YORK. Factory at BRIDGEPORT, CT.  
MANUFACTURERS OF  
**Fittings, Valves, Tools,**  
AND ALL STYLES OF  
Goods for Steam, Water, and Gas, Wrought Iron Pipe, &c.  
Agents for **BUNDY'S RADIATORS.**  
Manufacturers of  
DEANE'S PATENT SOLID STOCKS AND DIES.



**LIGHTNING HAY KNIVES.**  
WEYMOUTH'S PATENT.  
This knife is the best in use for cutting down hay and straw in mow and stack, cutting fine feed from bale, cutting corn stalks for feed, cutting post and ditching marshes.  
The blade is best cast steel, spring temper, easily sharpened, and is giving universal satisfaction. A few moments' trial will show its merits, and parties once using it are unwilling to do without it. Its sales are fast increasing for exports as well as home trade, and it seems destined to take the place of all other Hay Knives.  
They are nicely packed in boxes, one dozen each of 50 pounds weight, suitable for shipping by land or water to any part of the world.  
MANUFACTURED ONLY BY  
**HIRAM HOLT & CO.,**  
East Wilton, Franklin Co., Maine.  
For sale by the Hardware Trade generally.




**Ludlow Valve Mfg. Co.**  
OFFICE AND WORKS:  
938 to 954 River St. & 67 to 83 Vail Ave., Troy, N. Y.  
**VALVES.**  
Double and Single Gate, 1/4 in. to 48 in.—outside and inside Screws, Indicator, &c., for Gas, Water and Steam. Send for Circular.  
Also **FIRE HYDRANTS.**



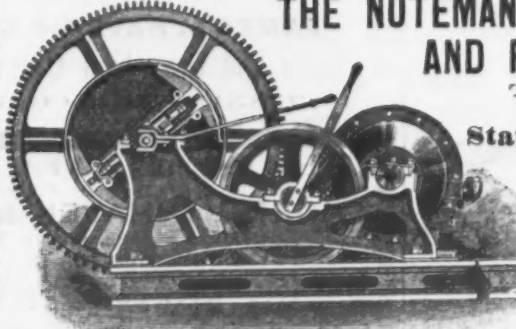
**BAGNALL & LOUD,**  
BOSTON, MASS.  
Sole Manufacturers in U. S. A. of our Celebrated  
**METALINE**  
Improved Sieve Roller  
Bush Tackle Blocks.  
Also a full line of every variety of TACKLE BLOCKS.  
Try Us with a Sample Order.  
Send for Illustrated Catalogue.  
New York Warehouse, 33 South Street.  
Western Agency: GURNEY & PHALAN, 247 Lake St., CHICAGO.




**UNION STONE COMPANY,**  
BOSTON, MASS.  
Patentees and Manufacturers  
OF THE  
**UNION EMERY WHEEL.**  
Emery, Emery Wheel Machinery and Tools  
A SPECIALTY.  
Automatic Knife Grinding Machines,  
WOOD POLISHING WHEELS,  
Emery Quartz, Cloth, Corundum,  
Grinders' and Polishers' Supplies.  
Catalogue on Application.



**THE NOTEMAN ROTARY ENGINE AND PUMP CO.**  
TOLEDO, OHIO.  
MANUFACTURE  
Stationary & Hoisting  
**ENGINES**  
High Speed Engines.  
**H. H. BALCH,**  
86 John St., New York.



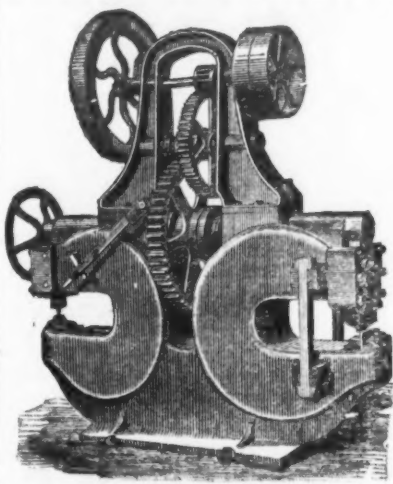
**NEW HAVEN NUT CO.**  
MANUFACTURERS OF  
HOT-PRESSED NUTS AND WASHERS,  
See Iron Age First Issue Each Month.  
WESTVILLE, CONN.




**P. BLAISDELL & CO.,**  
WORCESTER, MASS.  
Manufacturers of the  
**"BLAISDELL" UPRIGHT DRILLS**  
And other First-Class Machinists' Tools.




**COMBINED PUNCH & SHEARS.**  
Lambertville Iron Works,  
**A. WELCH,**  
LAMBERTVILLE, N. J.



**Holt's Forges.**  
FIVE SIZES.  
FOR ALL KINDS OF WORK.  
\$10 and Upward  
Send for circulars.  
**HOLT MFG. CO.,**  
Cleveland, Ohio.




**THE "EDDY" STRAIGHTWAY VALVES.**  
FIRE HYDRANTS.  
Axe, Hatchet, Powder and Brush Machinery.  
**THE EDDY VALVE COMPANY,**  
WATERFORD, N. Y.  
AGENTS IN ALL PRINCIPAL CITIES.  
Send for Price List.



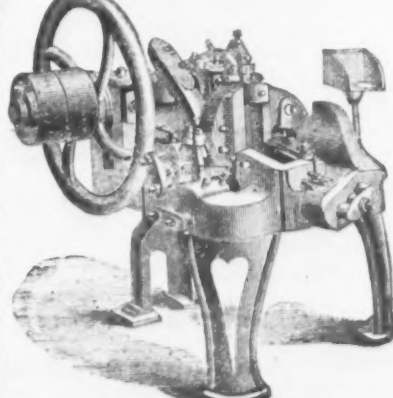
**THE LA FRANCE FIRE ENGINE CO.**  
MANUFACTURERS OF  
**Rotary Steam Fire Engines**  
ELMIRA, N. Y.



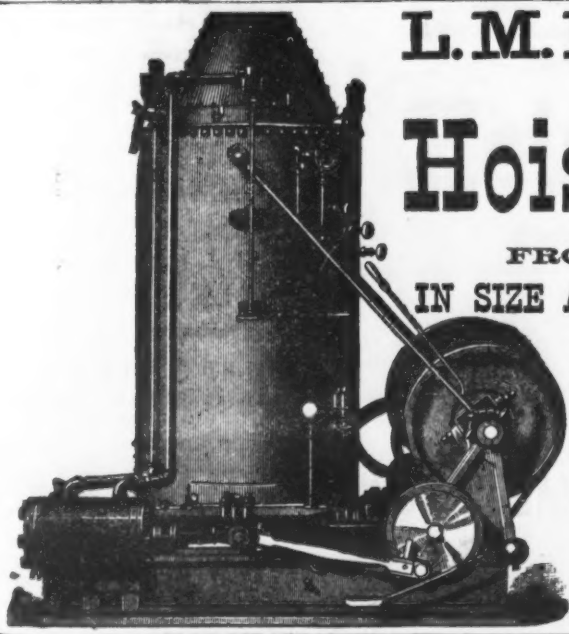
**DAILY PORTABLE HOIST.**  
Warranted double the power and not one-half the price of other hoists. As a proof of the above, I will give them 30 days on trial. Send for catalogue and price list.  
**J. DUNN,**  
32 Bank St., Cleveland, Ohio.



**PITTSBURGH MFG. CO.,**  
Manufacturers of Nail and Spike Machines, Bolt Nuts, Washers, Rivets, &c. Castings, Forgings and Blacksmith Work promptly attended to.  
Office and Works: Railroad Bldg., near 22nd, Pittsburgh, P.







**L. M. RUMSEY MFG. CO.**

ST. LOUIS, MO.

# Hoisting Engines

FROM 4 TO 50 HORSE POWER,  
IN SIZE AND STYLE TO SUIT REQUIREMENTS.

**SPECIAL COAL-HOISTING ENGINES**  
DOUBLE-CYLINDER MINING ENGINES,  
**ENGINES AND BOILERS**  
Pumping Machinery,  
MINING AND ENGINEERS' SUPPLIES.

**AMERICAN BOLT CO., Lowell, Mass.,**  
MANUFACTURERS OF  
**Bolts, Nuts, Washers, Chain Links, Car**  
**Bolts, Bridge Bolts, Lag Screws, &c.**

**LOWE'S METALLIC PAINT CO.,**  
CHATTANOOGA, TENN.,  
OFFER TO CONSUMERS

THE BEST METALLIC PAINT MANUFACTURED IN THE UNITED STATES

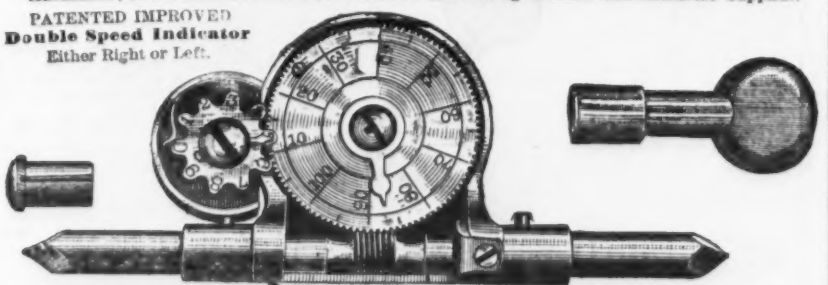


We have OVER 1000 CERTIFICATES from Railroad Officers, Wagon and Agricultural Implement Makers, Car Builders, Tin and Sheet Iron Roofers, Wrought Iron Bridge Companies and Blast Furnaces. We guarantee IT TAKES 25 PER CENT. LESS OIL, has more body and better covering properties than any other metallic paint.  
For sale by the principal paint dealers and hardware merchants in the United States.

**MONTGOMERY & CO.,**  
IMPORTERS  
Stubs' Files, Tools and Steel, Grobet Swiss Files,  
CHESTERMAN'S MEASURES,

Hubert's French Emery Paper, Horseshoe Magnets, &c.  
**WM. SMITH & SON'S CELEBRATED MUSIC W'RE, Nos. 2 to 30**  
French Sheet Steel, 3 1/4 in. wide, from 4 to 65 thousandths.

Machinists', Silversmiths', Jewelers', Die Sinkers' and Sewing Machine Manufacturers' Supplies.  
PATENTED IMPROVED  
Double Speed Indicator  
Either Right or Left.



105 Fulton St., NEW YORK.

**CHICAGO FORGING CO.,**  
No. 14 Metropolitan Block,  
CHICAGO, ILL.

**DROP FORGINGS**  
OF EVERY DESCRIPTION  
IRON AND STEEL

For Fire Arms, Saws and Wind Mills, Engine, Tool and Machine parts of all kinds, Railroad and Marine Work, Agricultural Implements and Machinery, Carriage and Wagon Irons, Electrical and other Apparatus.

Orders for Forgings in Iron or Steel required to be duplicated in large numbers, or which may be too small, intricate or expensive to be made by hand on the anvil, are especially solicited. Estimates furnished upon receipt of sample or patterns of forgings required.

**THE AMERICAN MACHINE CO.,**  
MANUFACTURERS OF

**HARDWARE SPECIALTIES.**  
Office and Factory  
Lehigh Ave. and American St., Philadelphia.  
Branch House:  
No. 198 Chambers St., New York.

**SPECIALTIES:** Fluting Machines, Hand Fluters, Plating Machines, Christmas Tree Holders, Bickford Portable Pump, Mrs. Potts' Patent Cold-Handle "Crown" Irons, Ice Cream Freezers and Cake Mixing Machines.

**J. F. WOLLENSAK'S**

PATENT

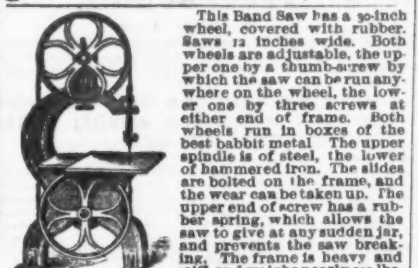
# Transom Lifter and Lock.

For all kinds  
of Transoms,  
Fanlights and  
Skylights.

Send for catalogue  
and price list.

**J. F. WOLLENSAK,**

Patentee and Sole Manufacturer,  
**CHICAGO, ILL.**



This Band Saw has a 30-inch wheel, covered with rubber. Saws 12 inches wide. Both wheels are adjustable, the upper one by a thumb-screw by which the saw can be run anywhere on the wheel, the lower one by three screws at either end of frame. The upper spindle is of steel, the lower of hammered iron. The slides are bolted on the frame, and the wear can be taken up. The upper end of screw has a rubber spring, which shows the saw to give at any sudden jar, and prevents the saw breaking. The frame is heavy and stiff, and weighs nearly 100 lbs. The tight and loose pulleys are 12 inches in diameter, and should make 450 revolutions per minute. The saw and one pair of Bracing Tongs, Form, Two Clamps, and Sniggs & Co., 210 Terrace, Buffalo, N. Y.

**Geo. A. Boynton**  
BROKER IN IRON  
70 WALL ST., N.Y.

**BOSTON.**

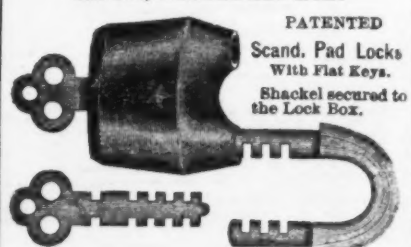
Reported by Macomber, Bigelow & Douce.

**Avril & Vice.**  
No. 1, \$2.25; 2, 4, 5, 6, 7, 8, 9, 10, 11, 12, 13, 14, 15, 16, 17, 18, 19, 20, 21, 22, 23, 24, 25, 26, 27, 28, 29, 30, 31, 32, 33, 34, 35, 36, 37, 38, 39, 40, 41, 42, 43, 44, 45, 46, 47, 48, 49, 50, 51, 52, 53, 54, 55, 56, 57, 58, 59, 60, 61, 62, 63, 64, 65, 66, 67, 68, 69, 70, 71, 72, 73, 74, 75, 76, 77, 78, 79, 80, 81, 82, 83, 84, 85, 86, 87, 88, 89, 90, 91, 92, 93, 94, 95, 96, 97, 98, 99, 100, 101, 102, 103, 104, 105, 106, 107, 108, 109, 110, 111, 112, 113, 114, 115, 116, 117, 118, 119, 120, 121, 122, 123, 124, 125, 126, 127, 128, 129, 130, 131, 132, 133, 134, 135, 136, 137, 138, 139, 140, 141, 142, 143, 144, 145, 146, 147, 148, 149, 150, 151, 152, 153, 154, 155, 156, 157, 158, 159, 160, 161, 162, 163, 164, 165, 166, 167, 168, 169, 170, 171, 172, 173, 174, 175, 176, 177, 178, 179, 180, 181, 182, 183, 184, 185, 186, 187, 188, 189, 190, 191, 192, 193, 194, 195, 196, 197, 198, 199, 200, 201, 202, 203, 204, 205, 206, 207, 208, 209, 210, 211, 212, 213, 214, 215, 216, 217, 218, 219, 220, 221, 222, 223, 224, 225, 226, 227, 228, 229, 230, 231, 232, 233, 234, 235, 236, 237, 238, 239, 240, 241, 242, 243, 244, 245, 246, 247, 248, 249, 250, 251, 252, 253, 254, 255, 256, 257, 258, 259, 260, 261, 262, 263, 264, 265, 266, 267, 268, 269, 270, 271, 272, 273, 274, 275, 276, 277, 278, 279, 280, 281, 282, 283, 284, 285, 286, 287, 288, 289, 290, 291, 292, 293, 294, 295, 296, 297, 298, 299, 300, 301, 302, 303, 304, 305, 306, 307, 308, 309, 310, 311, 312, 313, 314, 315, 316, 317, 318, 319, 320, 321, 322, 323, 324, 325, 326, 327, 328, 329, 330, 331, 332, 333, 334, 335, 336, 337, 338, 339, 340, 341, 342, 343, 344, 345, 346, 347, 348, 349, 350, 351, 352, 353, 354, 355, 356, 357, 358, 359, 360, 361, 362, 363, 364, 365, 366, 367, 368, 369, 370, 371, 372, 373, 374, 375, 376, 377, 378, 379, 380, 381, 382, 383, 384, 385, 386, 387, 388, 389, 390, 391, 392, 393, 394, 395, 396, 397, 398, 399, 400, 401, 402, 403, 404, 405, 406, 407, 408, 409, 410, 411, 412, 413, 414, 415, 416, 417, 418, 419, 420, 421, 422, 423, 424, 425, 426, 427, 428, 429, 430, 431, 432, 433, 434, 435, 436, 437, 438, 439, 440, 441, 442, 443, 444, 445, 446, 447, 448, 449, 450, 451, 452, 453, 454, 455, 456, 457, 458, 459, 460, 461, 462, 463, 464, 465, 466, 467, 468, 469, 470, 471, 472, 473, 474, 475, 476, 477, 478, 479, 480, 481, 482, 483, 484, 485, 486, 487, 488, 489, 490, 491, 492, 493, 494, 495, 496, 497, 498, 499, 500, 501, 502, 503, 504, 505, 506, 507, 508, 509, 510, 511, 512, 513, 514, 515, 516, 517, 518, 519, 520, 521, 522, 523, 524, 525, 526, 527, 528, 529, 530, 531, 532, 533, 534, 535, 536, 537, 538, 539, 540, 541, 542, 543, 544, 545, 546, 547, 548, 549, 550, 551, 552, 553, 554, 555, 556, 557, 558, 559, 560, 561, 562, 563, 564, 565, 566, 567, 568, 569, 570, 571, 572, 573, 574, 575, 576, 577, 578, 579, 580, 581, 582, 583, 584, 585, 586, 587, 588, 589, 590, 591, 592, 593, 594, 595, 596, 597, 598, 599, 600, 601, 602, 603, 604, 605, 606, 607, 608, 609, 610, 611, 612, 613, 614, 615, 616, 617, 618, 619, 620, 621, 622, 623, 624, 625, 626, 627, 628, 629, 630, 631, 632, 633, 634, 635, 636, 637, 638, 639, 640, 641, 642, 643, 644, 645, 646, 647, 648, 649, 650, 651, 652, 653, 654, 655, 656, 657, 658, 659, 660, 661, 662, 663, 664, 665, 666, 667, 668, 669, 670, 671, 672, 673, 674, 675, 676, 677, 678, 679, 680, 681, 682, 683, 684, 685, 686, 687, 688, 689, 690, 691, 692, 693, 694, 695, 696, 697, 698, 699, 700, 701, 702, 703, 704, 705, 706, 707, 708, 709, 710, 711, 712, 713, 714, 715, 716, 717, 718, 719, 720, 721, 722, 723, 724, 725, 726, 727, 728, 729, 730, 731, 732, 733, 734, 735, 736, 737, 738, 739, 740, 741, 742, 743, 744, 745, 746, 747, 748, 749, 750, 751, 752, 753, 754, 755, 756, 757, 758, 759, 760, 761, 762, 763, 764, 765, 766, 767, 768, 769, 770, 771, 772, 773, 774, 775, 776, 777, 778, 779, 780, 781, 782, 783, 784, 785, 786, 787, 788, 789, 790, 791, 792, 793, 794, 795, 796, 797, 798, 799, 800, 801, 802, 803, 804, 805, 806, 807, 808, 809, 810, 811, 812, 813, 814, 815, 816, 817, 818, 819, 820, 821, 822, 823, 824, 825, 826, 827, 828, 829, 830, 831, 832, 833, 834, 835, 836, 837, 838, 839, 840, 841, 842, 843, 844, 845, 846, 847, 848, 849, 850, 851, 852, 853, 854, 855, 856, 857, 858, 859, 860, 861, 862, 863, 864, 865, 866, 867, 868, 869, 870, 871, 872, 873, 874, 875, 876, 877, 878, 879, 880, 881, 882, 883, 884, 885, 886, 887, 888, 889, 890, 891, 892, 893, 894, 895, 896, 897, 898, 899, 900, 901, 902, 903, 904, 905, 906, 907, 908, 909, 910, 911, 912, 913, 914, 915, 916, 917, 918, 919, 920, 921, 922, 923, 924, 925, 926, 927, 928, 929, 930, 931, 932, 933, 934, 935, 936, 937, 938, 939, 940, 941, 942, 943, 944, 945, 946, 947, 948, 949, 950, 951, 952, 953, 954, 955, 956, 957, 958, 959, 960, 961, 962, 963, 964, 965, 966, 967, 968, 969, 970, 971, 972, 973, 974, 975, 976, 977, 978, 979, 980, 981, 982, 983, 984, 985, 986, 987, 988, 989, 990, 991, 992, 993, 994, 995, 996, 997, 998, 999, 1000.

**STAR LOCK WORKS.**

ESTABLISHED 1886.

Trunk Locks, Door Springs, Pad Locks, Trunk Stays, Dead Latches, Keys, &c., 110 South 8th St., and Sanson, bet. 8th and 9th, PHILADELPHIA.



**HILLEBRAND & WOLF.**

THE BOLTON STEEL CO.

MANUFACTURERS OF  
THE BEST REFINED

**TOOL STEEL**

AND OTHER FINE GRADES OF

**CAST STEEL.**

**CANTON STEEL WORKS,**

CANTON, OHIO.

**CUN POWDER.**

**Lafin & Rand Powder Co.**

No. 99 Murray Street, New York.

Manufacture and sell the following celebrated brand of Sporting Powder known everywhere as

**ORANGE LIGHTNING,**

**ORANGE DUCKING,**

**ORANGE RIFLE**

more popular than any powder now in use.

**Blasting Powder and Electrical Blasting Apparatus.**

**Military Powder** on hand and made to order

**SAFETY FUSE, FRICITION & PLATINUM FUSES.**

Pamphlets showing sizes of grain sent free.

**THE DUPLEX INJECTOR.**

**SIMPLE,**

**RELIABLE**

**AND**

**DURABLE.**

The constantly increasing sales of this Injector attest its superiority as a Boiler Feeder.

Manufactured by

**JAMES JENKS,**

48, 50, 52 and 54 Randolph St.,

DETROIT, MICH.

**NOTICE.**

To the Hardware Trade,

Wholesale and Retail.

Before buying, send to me for quotations.

Will give special figures lower than market rates on a large line of Shelf Hardware and Tinware. Have also an immense stock of special job lots in which I can give decided bargains.

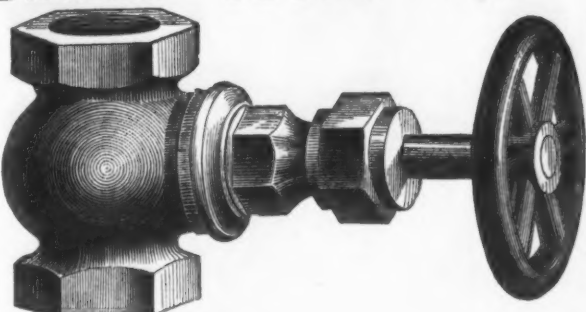
**A. W. WHEELER,**

141 Lake Street, CHICAGO.

Curry.—Pocket American Shear Co.'s.....dis 40 5  
Butcher Knives Wood's, Lap Bolster.....dis 30 5  
Square Handle.....dis 30 5  
Staple Knives.....dis 20 5  
Lap Bolster, Oval Handle.....dis 20 5  
Sinking.....dis 20 5  
Skinner.....dis 20 5  
Butcher, Common Round Handle, Wood's.....dis 20 5  
Shoe Knives, Wood's.....dis 20 5  
Dividers.—Cook's.....dis 20 5  
Dog Collars.....dis 20 5  
Door Springs.—Torrey's Rod.....dis 20 5  
Imitation Torrey's Rod.....dis 20 5  
Gem Coll. new list.....dis 20 5  
Crown.....dis 20 5  
Warner's.....dis 20 5  
Door Stops.—Thurston's.....dis 20 5  
Drawer Knobs.—Thurston's.....dis 20 5  
Drills.—Morse Bit Stock.....dis 20 5  
Morse Straight Shank.....dis 20 5  
Emery.—Wellington Mills.....dis 20 5  
Walpole Emery Mills.....dis 20 5  
Turkish in 10 cans.....dis 20 5  
Emeryed Ware.....dis 20 5  
Standard Mfr. Co. Kettles.....dis 20 5  
Standard Sauce Pans.....dis 20 5  
Felloe Plates.—Wrought.....dis 20 5  
Files.—American File Co.....dis 20 5  
Nicholson File Co.....dis 20 5  
Fluting Machines.—Knox list, \$4.00.....dis 20 5  
American list, \$3.40.....dis 20 5  
Forks.—W. C. & Co. Manure.....dis 20 5  
Gimlet Bits.....dis 20 5  
Genuine German, No. 125, 1-32 to 3-32, per doz \$1.00  
Pierce's.....dis 20 5  
Glass Cutters.—Combination Glass Cutter and  
Knife Sharpener.....dis 20 5  
Grub Hoes.—E. P. & Co. No. 2, \$1.50 W. do, \$1.50  
Hammers.—Maydo's.....dis 20 5  
Hartford Hammer Co.....dis 20 5  
Hangers & Rollers.—Anti-Friction.....dis 20 5  
Acme Rollers.....dis 20 5  
Common Hangers.....dis 20 5  
Common Rollers.....dis 20 5  
Hand Screws.....dis 20 5  
Hatchets.—C. F. Dowse new list.....dis 20 5  
Underhill.....dis 20 5  
Hay & L. L. Lightning.....dis 20 5  
Sawyer's Patent.....dis 20 5  
Hinges.—Strap and T (new list).....dis 20 5  
Providence Plate.....dis 20 5  
Copper.....dis 20 5  
Hoes.—W. C. & Co.'s.....dis 20 5  
Hooks and Staples.—Brower's (new list).....dis 20 5  
Horse Nails.....dis 20 5  
National Finished.....dis 20 5  
Putnam Pointed.....dis 20 5  
Bridge Water.....dis 20 5  
Ice Cream Freezers.—Packer's, new list.....dis 20 5  
Knobs.—"Norwalk" New list.....dis 20 5  
Silver Glass Bell Pulls.....dis 20 5  
Lauers.—Tabular, No. 2.....dis 20 5  
Railroad Oil, No. 45.....dis 20 5  
Triangular.....dis 20 5  
Lawn Mowers.—The "Daisy".....dis 20 5  
12 in. cut.....dis 20 5  
14 in. cut.....dis 20 5  
16 in. cut.....dis 20 5  
18 in. cut.....dis 20 5  
Lead.—Sheet.....dis 20 5  
Pipe.....dis 20 5  
Locks.—Norwalk.....dis 20 5  
Eagle Cabinet.....dis 20 5  
Eagle Trunk.....dis 20 5  
W. Wilcox & Co., Padlocks.....dis 20 5  
Manure Forks.—W. C. & Co.....dis 20 5  
Mauls.—E. P. & Co., Long Cutter, \$1.50 W. do, \$1.50  
E. P. & Co., Short Cutter, \$1.50 W. do, \$1.50  
E. P. & Co., Pick Cutter, \$1.50 W. do, \$1.50  
Measuring Tapes.—Eddy's.....dis 20 5  
Ment Cutters.—Miles' Challenge.....dis 20 5  
Hale's (new list).....dis 20 5  
American.....dis 20 5  
Money Drawers.—Tucker's, \$1.50 W. do, \$1.50  
Mouse Traps.—Delusion.....dis 20 5  
Novelty.....dis 20 5  
Nails.....dis 20 5  
Oilers.—Zinc and Lin.....dis 20 5  
Bross and Copper.....dis 20 5  
Ox Hoes.—Extra finished and varnished.....dis 20 5  
14 in. W. do, pair.....dis 20 5  
14 in. W. do, pair.....dis 20 5  
Paper.—Tarred Sheathing.....dis 20 5  
Tarred Eagle Brand.....dis 20 5  
Picks.—E. P. & Co., Adze Eye, \$1.50 W. do, \$1.50  
E. P. & Co., Adze Eye, 6 to 7 W. do, \$1.50  
Plans.—Fancy Plans.....dis 20 5  
Base Plans.....dis 20 5  
N. Y. Foot Co.....dis 20 5  
English Iron.....dis 20 5  
Belt's.....dis 20 5  
Plated Ware.—Rogers & Bro.....dis 20 5  
Pliers.—Von Cleft & Co.'s.....dis 20 5  
Butt's Wire Pliers.....dis 20 5  
Plumb & Levels.—Stanley R. & L. Co.....dis 20 5  
Pocket Knives.—American Shear Co.'s.....dis 20 5  
Pole Diggers.—W. C. & Co., reduced list.....dis 20 5  
Pulley Blocks.—Acme or Excelsior, 14 in.....dis 20 5  
Acme or Excelsior, 12 in.....dis 20 5  
Pulley Blocks.....dis 20 5  
Pumps.—Union Manufacturing Co.....dis 20 5  
Iron Clusters.....dis 20 5  
Iron Fitcher Spout.....dis 20 5  
Copper.....dis 20 5  
Rivets.—Black (new list).....dis 20 5  
Carriage in 10 papers (new list).....dis 20 5  
Copper.....dis 20 5  
Razors.—Torrey's.....dis 20 5  
Razor Straps.—Torrey's.....dis 20 5  
Rules.—Stanley, Boxwood.....dis 20 5  
Stanley, Ivory.....dis 20 5  
Saw Irons.—Common.....dis 20 5  
Saw Irons.....dis 20 5  
Tailors' Geese.....dis 20 5  
Enterprise, "Potts".....dis 20 5  
Sash Locks.—King & Hutchinson's, new list.....dis 20 5  
Sawpaper.—Bader & Adams.....dis 20 5  
Sash Weights.—Patent Eye.....dis 20 5  
Saws.—Bader & Adams.....dis 20 5  
Wheeler & Clemson.....dis 20 5  
Cross-Cut Saws.....dis 20 5  
W. C. & Co., Common Tooth, No. 1.....dis 20 5  
W. C. & Co., Champion Tooth.....dis 20 5  
Dianon's, Common Tooth.....dis 20 5  
Dianon's, Great American Tooth.....dis 20 5  
Boynton's Light Iron Tooth.....dis 20 5  
M. B. & D., Hand Saws.....dis 20 5  
M. B. & Co.'s Circular.....dis 20 5  
Richardson Bros.....dis 20 5  
Saw Blades.—Dianon.....dis 20 5  
W. C. & Co., Grind.....dis 20 5  
W. C. & Co., Grind.....dis 20 5  
Welch & Griffith, No. 2.....dis 20 5  
Scales.—railroads.....dis 20 5  
Screws.—Aiken's Flat-Head Iron new list.....dis 20 5  
American Flat-Head Iron.....dis 20 5  
American Flat-Head Iron.....dis 20 5  
American Round-Head Iron.....dis 20 5  
Grillier Round-Head Iron.....dis 20 5  
Screws.—Chippers, in boxes.....dis 20 5  
Shaves.—Kimball's.....dis 20 5  
Vatrous.....dis 20 5  
Shore's.....dis 20 5  
Shot.—Tatham's.....dis 20 5  
Shovels.—O. Ames, new list.....dis 20 5  
O. Ames, other brand, new list.....dis 20 5  
Sinks.....dis 20 5  
Snow Shovels.....dis 20 5  
States.—Union.....dis 20 5  
Imperial Club list No. 5, \$3.75 W. pair list No. 7,  
\$4.00 W. pair.....dis 20 5  
Stacks and Dies.—King's.....dis 20 5  
Tacks.....dis 20 5  
Sweden Tinned.....dis 20 5  
Gimp and Lace.....dis 20 5  
Copper Tacks.....dis 20 5  
All balances on list.....dis 20 5  
Traps.—Onida, Genuine.....dis 20 5  
Onida, Imitation, H. & N.....dis 20 5  
Pliers.—Simpson's, Adjustable.....dis 20 5  
Howard Vice Co.....dis 20 5  
Weather Strips.—Packer's.....dis 20 5  
Brown's Flexible Rubber.....dis 20 5  
In 25 foot boxes: No. 1, 1/2 in. wide, 1/2 yard, 100; No. 2,  
1/2 in. wide, 1/2 yard, 100; No. 3, 1/2 in. wide, 1/2 yard, 100  
Black Walnut Spring Weather Strips.....dis 20 5  
Window Springs.....dis 20 5  
Babcock's No. 3.....dis 20 5  
B



**McNab & Harlin Mfg. Co.,**  
MANUFACTURERS OF  
**BRASS COCKS AND VALVES,**  
For STEAM, WATER, and GAS.  
Wrought Iron Pipe and Fittings,  
PLUMBERS' MATERIALS,  
Factory, Paterson, N. J. 56 John Street, N. Y.



**BLACK AND TINNED IRON RIVETS.**

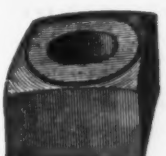


**W. P. TOWNSEND & CO.,**  
PITTSBURGH, PA.,  
Manufacturers of every description of First Quality  
**RIVETS.**  
H. B. NEWHALL CO.,  
105 Chambers St.,  
New York Agents.

**WM. H. HASKELL CO.,**  
Pawtucket, R. I.  
MANUFACTURERS OF  
**COACH SCREWS,**  
(With Gimlet Points.)  
ALL KINDS OF  
Machine and Plow Bolts,  
AND  
TAP BOLTS.  
HENRY B. NEWHALL CO.,  
105 Chambers St., New York,  
and 47 Pearl St., Boston,  
(J. H. WORK, Manager),  
EASTERN AGENTS.



**STANDARD NUT CO.,**  
Pittsburgh, Pa.,  
MANUFACTURERS OF  
**HOT PRESSED**  
Square & Hexagon Nuts,  
**R. R. FISH BARS,**  
**BOLTS.**  
HENRY B. NEWHALL CO.,  
105 Chambers St., New York,  
and 47 Pearl St., Boston,  
(J. H. WORK, Manager),  
EASTERN AGENTS.  
**SPIKES.**  
**RIVETS, &c.**




**Philadelphia Bolt Works.**  
NORWAY IRON FANCY HEAD BOLTS,  
Carriage & Tire Bolts. Star Axle Clips, &c.  
TOWNSEND, WILSON & HUBBARD, 2301 Cherry Street, Philadelphia, Pa.



**G. W. Bradley's Edge Tools.**  
Butchers' Cleavers,  
Butchers' Choppers,  
Axes and Hatchets,  
Crab Hoes and Mattocks,  
Mill Picks,  
Box Chisels and Scrapers,  
Ring Bush Hooks,  
Ax Eye Bush Hooks,  
Socket Bush Hooks,  
Watt's Ship Carpenters' Tools,  
Carpenters' Drawing Knives,  
Coopers' and Turpentine Tools.  
FOR SALE BY  
MARTIN DOSCHER, Agent, 85 Chambers Street, N. Y.  
**BRONZE** AMERICAN BRONZE WORKS. **BEARINGS.**  
BRONZE AND BRASS BEARINGS  
AND ORNAMENTAL CASTINGS.  
CAR AND LOCOMOTIVE WORK A SPECIALTY.  
28 Columbus Street, Cleveland, O.

**EATON, COLE & BURNHAM CO.,**  
58 John St., NEW YORK. Factory at BRIDGEPORT, CT.  
MANUFACTURERS OF  
**Fittings, Valves, Tools,**  
AND ALL STYLES OF  
Goods for Steam, Water, and  
Gas, Wrought Iron Pipe, &c.  
Agents for **BUNDY'S RADIATORS.**  
Manufacturers of  
DEANE'S PATENT SOLID STOCKS AND DIES.



**LIGHTNING HAY KNIVES.**  
WEYMOUTH'S PATENT.  
This knife is the best in use for cutting down hay and straw in mow and stack, cutting fine feed from bales, cutting corn stalks for feed, cutting post and ditching marshes.  
The blade is best cast steel, spring temper, easily sharpened, and is giving universal satisfaction. A few moments' trial will show its merits, and parties once using it are unwilling to do without it. Its sales are fast increasing for exports as well as home trade, and it seems destined to take the place of all other Hay Knives.  
They are nicely packed in boxes, one dozen each of 50 pounds weight, suitable for shipping by land or water to any part of the world.  
MANUFACTURED ONLY BY  
**HIRAM HOLT & CO.,**  
East Wilton, Franklin Co., Maine.  
For sale by the Hardware Trade generally.




**Ludlow Valve Mfg. Co.**  
OFFICE AND WORKS:  
938 to 954 River St. & 67 to 83 Vall Ave., Troy, N. Y.  
**VALVES.**  
Double and Single Gate, 1/2 in. to 48 in.—outside and inside Screws, Indicator, &c.,  
for Gas, Water and Steam. Send for Circular.  
Also **FIRE HYDRANTS.**  
**BAGNALL & LOUD,**  
BOSTON, MASS.  
Sole Manufacturers in U. S. A. of our Celebrated  
**METALINE**  
AND  
Improved Sleeve Roller  
Bush Tackle Blocks.  
Also a full line of every variety of  
TACKLE BLOCKS.  
Try Us with a Sample Order.  
Send for Illustrated Catalogue.  
New York Warehouse, 33 South Street.  
Western Agency: GURNEY & PHALAN, 247 Lake St., CHICAGO.

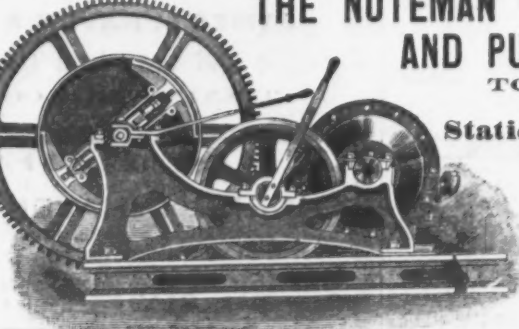




**UNION STONE COMPANY,**  
BOSTON, MASS.  
Patentees and Manufacturers  
OF THE  
**UNION EMERY WHEEL.**  
Emery, Emery Wheel Machinery and Tools  
A SPECIALTY.  
Automatic Knife Grinding Machines,  
WOOD POLISHING WHEELS,  
Emery Quartz, Cloth, Corundum,  
Grinders' and Polishers' Supplies.  
Catalogue on Application.



**THE NOTEMAN ROTARY ENGINE AND PUMP CO.**  
TOLEDO, OHIO.  
MANUFACTURE  
Stationary & Hoisting  
**ENGINES**  
High Speed Engines.  
**H. H. BALCH,**  
86 John St., New York.



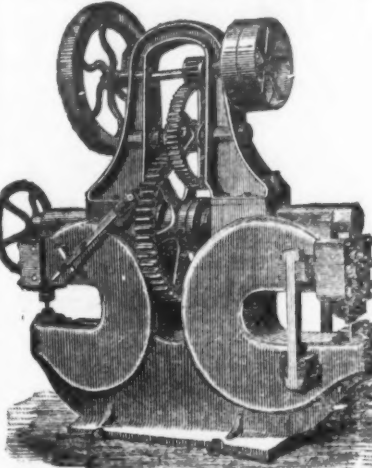
**NEW HAVEN NUT CO.**  
MANUFACTURERS OF  
HOT-PRESSED NUTS AND WASHERS,  
See Iron Age First Issue Each Month.  
WESTVILLE, CONN.




**P. BLAISDELL & CO.,**  
WORCESTER, MASS.  
Manufacturers of the  
**"BLAISDELL" UPRIGHT DRILLS**  
And other First-Class Machinists' Tools.



**COMBINED  
PUNCH & SHEARS.**  
**Lambertville Iron Works,**  
**A. WELCH,**  
LAMBERTVILLE, N. J.



**Holt's Forges.**  
FIVE SIZES.  
FOR ALL KINDS OF WORK.  
\$10 and Upward  
Send for circular.  
**HOLT MFG. CO.,**  
Cleveland, Ohio.




**THE "EDDY" STRAIGHTWAY VALVES.**  
ALSO  
**FIRE HYDRANTS.**  
Axe, Hatchet, Powder and  
Brush Machinery.  
**THE EDDY VALVE COMPANY,**  
WATERFORD, N. Y.  
AGENTS IN ALL PRINCIPAL CITIES.  
Send for Price List.



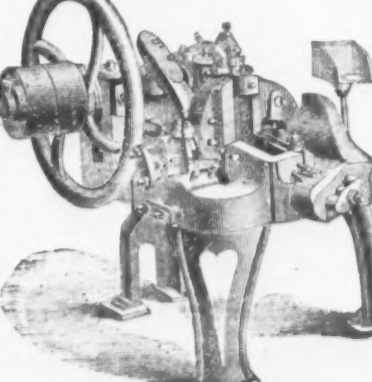
**THE LA FRANCE FIRE ENGINE CO.**  
MANUFACTURERS OF  
**Rotary Steam Fire Engines**  
ELMIRA, N. Y.



**BAILY PORTABLE HOIST.**  
Warranted double the power and not one-half the price of other hoists. As a proof of the above, I will give them 30 days on trial. Send for catalogue and price list.  
**J. DUNN,**  
32 Bank St., Cleveland, Ohio.

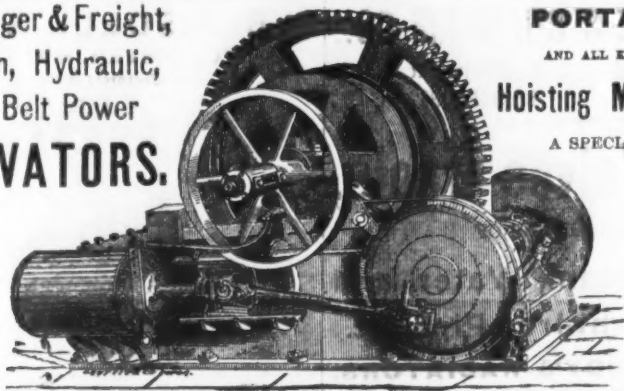


**PITTSBURGH MFG. CO.,**  
Manufacturers of Nail and Spike Machines, Bolt Nuts, Washers, Rivets, &c. Castings, Forgings and Blacksmith Work promptly attended to.  
Office and Works: Railroad St., near 28th, Pittsburgh, P.





Passenger & Freight,  
Steam, Hydraulic,  
and Belt Power  
**ELEVATORS.**



**PORTABLE**  
AND ALL KINDS OF  
**Hoisting Machinery**  
A SPECIALTY.

## IRON FURNACE HOIST,

For Handling Stock to Top of Stack with One or Two Platforms.  
STOKES & PARRISH, 3001 Chestnut St., Philadelphia.

**\$\$\$ SAVED \$\$\$**

**1977 NINETEEN HUNDRED SEVENTY-SEVEN 1977**  
**MACHINES**

**BOTH NEW AND SECOND-HAND**

COMPRISING  
MACHINE AND BLACKSMITH  
TOOLS OF EVERY DESCRIPTION.  
WOOD-WORKING MACHINERY IN ALL ITS  
BRANCHES. PORTABLE ENGINES. UPRIGHT and HOR-  
IZONTAL STATIONARY ENGINES. 1 TO  
500 HORSE POWER. S.C.F. & CO. LOCOMOTIVE FIRE-  
BOX, HORIZONTAL, and UPRIGHT BOIL-  
ERS, 1 TO 100 HORSE POWER. WATER WHEELS, OOT-  
TON AND WOOLEN MACHINERY, STEAM  
PUMPS, GRISTMILL MACHINERY,  
Etc., FULLY DESCRIBED, AND  
PRICES ANNEXED.

Send stamp for same.

In our List No. 23.

[stating what you want.]

We have the Largest Assortment of Machinery to be  
found in the hands of any firm in the country.

Works and Main Office,  
Manchester, N. H.

**S. C. FORSAITH & CO.**

Branch Office and Wareroom, 209 Centre street, New York City.

**THE PUSEY & JONES COMPANY,**  
WILMINGTON, DELAWARE,

BUILDERS OF

**STEAM ENGINES,**

Boilers, Tanks,

MACHINERY FOR ROLL-  
ING MILLS,

Punches, Shears,

Machines for Cutting off and  
Slicing old Railroad Rails pre-  
vious to being piled in Rolling  
Mills.

Steam Riveting Machines,  
Applicable to Bridge Builders' Work.

RIGHT AND LEFT ANGLE  
IRON CUTTERS,

Hydraulic Bending  
Machines,  
AND HEAVY MACHINERY  
GENERALLY.

**GARDNER'S**

**PATENT**

**Three Cylinder  
ENGINE.**

The Most Simple and  
**DURABLE**  
Steam Engine in Use.  
Adapted for any duty.  
Send for Illustrated  
CATALOGUE  
Giving full Description.

**EVERY ENGINE WARRANTED.**

OVER 1000 H. P. IN USE. Correspondence invited. Special Engine for HIGH SPEEDS, price  
of which will be quoted upon application. MANUFACTURED

**EXCLUSIVELY**

BY R. DUNBAR & SON, Buffalo, New York, U. S. A.

**DROP FORGINGS**

Of Every Description a Specialty.

ADDRESS,

**R. H. BROWN & CO.,**  
WESTVILLE, CONN.

Also Manufacturers of

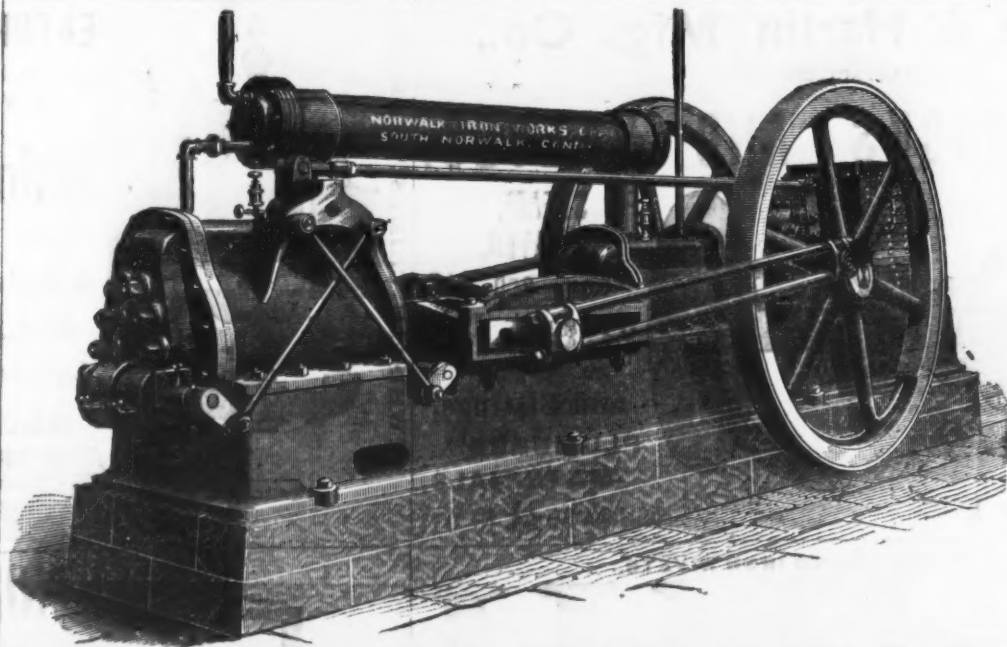
**W. A. CLARK'S PATENT EXPANSIVE BIT,**

**CLARK'S PATENT HANDLE SCREW DRIVER,**

And Other Specialties in Hardware Line.

**J. H. WEBSTER, 111 Bank St., CLEVELAND, OHIO. LAWYER.**

Precept personal attention to collections, with immediate remittance. Refer to Wm. Bingham & Co.



**AIR  
COMPRESSORS.**

THE NORWALK IRON WORKS CO., South Norwalk, Conn.

**E.W. BLISS**  
**PRESSES & DIES.**

SHAPERS & SQUARING SHEARS

No. 20.  
ADJUSTABLE  
POWER PRESS  
UPRIGHT POSITION



FINE ENGINE LATHES.

**SPECIAL MACHINERY FOR TIN & SHEET**

**METAL WORKERS**

PLYMOUTH, PEARL & JOHN ST'S. BROOKLYN, N.Y.

**MANNING, MAXWELL & MOORE,**

Sole Sales Agents for THE HORSE TWIST DRILL AND MACHINE CO.'S



111 Liberty Street. NEW YORK.

**THE HANCOCK INSPIRATOR.**

The best Feeder known for Stationary, Marine and  
Locomotive Boilers.

**REQUIRES NO OILING.**

Consumes Less Steam Than Any Other Boiler Feeder.

**SIMPLE, RELIABLE AND ALWAYS IN ORDER.**

**FAIRBANKS & CO.**

311 Broadway. NEW YORK.

**CINCINNATI MALLEABLE IRON FOUNDRY,**

JAMES L. HAVEN & CO., No. 56 Plum Street.

Malleable and Gray Iron Castings, Pattern Making, Bronzing,  
TINNING AND COPPERING TO ORDER.

**THOS. H. DALLETT & CO.**

SUCCESSORS TO

**THORNE, DeHAVEN & CO., Drilling Machines,**  
21st Street, above Market, Philadelphia.

PORTABLE DRILLS, Driven by power in any direction. RADIAL DRILLS,  
Self-feed—Large Adjustable Box Table. VERTICAL DRILLS, Self-feeding. MUL-  
TIPLE DRILLS, 2 to 20 Spindles. HORIZONTAL BORING AND DRILLING  
MACHINES. HAND DRILLS. CAR BOX DRILLS. SPECIAL DRILLS,  
For Special Work.

EXCELSIOR WORKS.

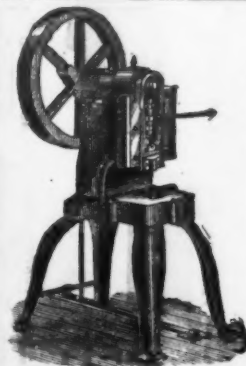
BOLTS, NUTS, WASHERS, WOOD SCREWS,

Upset Rods, Car and Builders' Forgings

And General Builders' Ironwork.

**KING & PEROT,**

2 E. Cor. American & York Sts., Philadelphia, Pa.



**A. H. MERRIMAN,**  
Meriden, Conn.,  
Manufacturer of all Descriptions of  
**PRESSES.**  
Catalogue and prices sent on application.



**DEAD-STROKE POWER HAMMERS.**



**DIENELT & EISENHARDT,**  
MAKERS,  
1310 Howard St., Philadelphia.

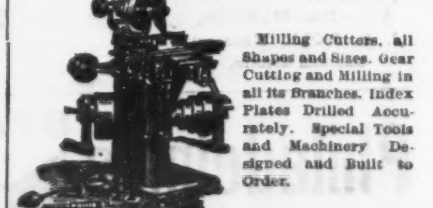
**E. E. GARVIN & CO.,**

Machinists and Manufacturers of

MILLING MACHINES, DRILL PRESSES, HAND

LATHES, TAPPING MACHINES,

CUTTER GRINDERS & WOOD PLANERS.



Power Milling Machine.

141 Centre St., New York. Send for Illustrated Catalogue.



Standard Weight Lap Welded

**WROUGHT IRON PIPE, &c.,**

**STEAM PUMPS, &c.,**

STEAM AND HYDRAULIC

Freight & Passenger Elevators, &c.

**STEAM HOISTING ENGINES, &c**

MANUFACTURED BY

**CRANE BROS. MFG. CO.,**

CHICAGO.

Send for Catalogue.



## Machinery, &amp;c.

## LYON'S HAND OR POWER PUNCHES AND SHEARS.



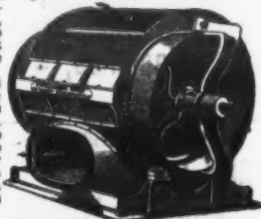
For Round, Flat or Square Iron,  
Polishing & Buffing Machinery,  
**HYDRAULIC JACKS,**  
To raise from 2 to 120 tons.  
Hydraulic Presses for Special & General Use,  
**HYDRAULIC HAND & POWER PUMPS**  
with 1 to 5 plungers, to run hydraulic presses, with  
either uniform or changeable speed.

Second-hand Presses.  
**WATSON & STILLMAN,**  
(Successors to E. LYON & CO.)  
470 B Grand Street, NEW YORK.  
Send for circular of what you want.

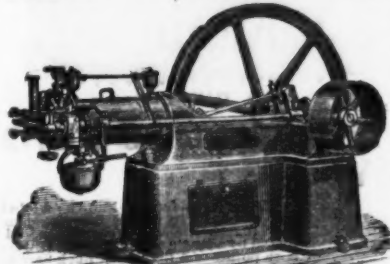
THE MACKENZIE PATENT  
CUPOLA & BLOWER.

Send for circular to  
**Smith & Savre Mfg. Co.,**  
PROPRIETORS, 245 Broadway, New York.

This Cupola has made a great revolution in melting iron. It differs from all others in having a continuous tuyere, or in other words, the blast enters the fuel at all points. Above one ton capacity per hour, they are made oval in form. This brings the blast to the center of the furnace with the least resistance and smallest possible amount of power, and in combination with the continuous tuyere causes complete diffusion of the air throughout the furnace, and uniform temperature, melting ten or fifteen tons an hour with the pressure of blast required to melt two or three tons in an ordinary Cupola. It also enables us to save very largely in time and fuel, the experience of our customers showing a gain of twenty-five to fifty per cent. in time, and twenty-five to forty per cent. fuel over the ordinary Cupola, and a better quality of casting, especially in light work. This is due to the thorough diffusion of the air and more perfect combustion, extracting less carbon from the iron, making a softer and tougher casting. We manufacture these Cupolas of any desired capacity, numbered from 1 to 20, inclusive, the numbers denoting the melting capacities in tons per hour—No. 1, one ton; No. 2, two tons; No. 3, three tons per hour, and so on up to 20 tons. We have improved the construction of these Cupolas in every way, have increased their strength and durability, and sought to make them as convenient for working and repairs as our own and the experience of our customers could suggest.



## NEW OTTO SILENT GAS ENGINE.



Working Without Boiler, Steam,  
Coal, Ashes or Attendance.  
Started Instantly by a Match, it gives Full  
Power Immediately.

When Stopped, all Expense Censes.  
No explosions, no fires nor cinders, no vapors, no pumps, no engineer or other attendants while running. Recommended by insurance companies.  
UNSURPASSED IN EVERY RESPECT for hoisting in warehouses, printing, ventilating, running small shops, &c.  
1, 2, 4, 7, 10, 15 and 25 Horse-Power. Built by  
**SCHLEICHER, SCHUMM & CO.,**  
Engineers and Machinists,  
N. E. Cor. 33d & Walnut Sts., Philadelphia.  
214 Randolph St., Chicago.

STEPHEN A. MORSE.

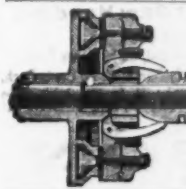
C. M. WILLIAMS.

EDWIN F. MORSE.

SEND  
FOR  
CIRCULARS.**CLEM & MORSE,**LATEST  
PATENTED  
IMPROVEMENTS.**ELEVATORS,**

Hoisting Machinery, Automatic Hatch Doors, &amp;c.

413 Cherry St., PHILADELPHIA, PA. Branch Office, 108 Liberty St., NEW YORK.

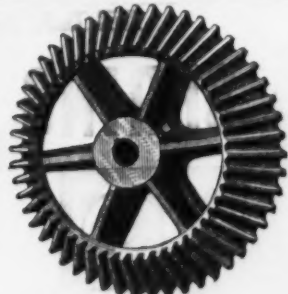


## HOISTING ENGINES.

We are now prepared to deliver 6x12 and 7x12 single cylindered Horizontal Engines, and double cylindered at short notice, with the *Friction Friction Clutch* attached, with or without boilers. This clutch has proved to be the best in the world for this work. It can be so adjusted that it will do a small amount of work, and from that up to the full power of engine, with no risk of breaking ropes, gearing or engine, a feature which no other friction contains. Address.  
**D. FRISBIE & CO., 481 N. Fifth St., Phila., Pa.**

MACHINE  
MOLDED  
GEARING

From 1 to 20 feet  
Diameter.

SHAFTING,  
PULLEYS

AND

## HANGERS

A Specialty.

**POOLE & HUNT, BALTIMORE, MD.****WICKERSHAM & CO.,**  
MANUFACTURERS OF  
RAILWAY, MINERS', MILL & MACHINISTS'  
SUPPLIES.

W. & Co.'s Packing: Steam, Hydraulic and Locomotive. Samples sent free.  
Lubricants for Engines, Shafting, &c.; Rolling Mill, Railroad, Gear and Axle Grease.  
Also, Star Cylinder Oils.  
No. 309 Race Street, Philadelphia, Pa.  
No. 232 LAKE STREET, Chicago, Ill.

## DRILL PRESSES.



New Upright Power  
Drill Presses. No. 3  
swings 21 inches; back  
geared, quick return.  
A strong iron brace  
extends from base to head  
of column—a new fea-  
ture. Weight, 1100 lbs.;  
height, 6 feet. Price,  
\$210.

No. 14, on legs,  
swings 14 inches, 4  
speeds. Price, \$85.  
No. 1 also, to set on  
bench, swings 13 inches,  
lever feed, 3 speeds,  
tight and loose pulleys.  
Price, \$35.

Peerless Punch & Shear Co.,  
38 W. Day Street, New York.

## PUNCHING &amp; SHEARING PRESSES.

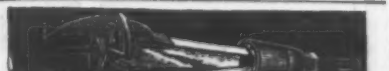


Power, Foot or  
Hand  
PUNCHES,  
AND  
SHEARS.

All sizes, from \$25 to \$3000  
Peerless Punch &  
Shear Co.,  
38 W. Day Street,  
NEW YORK CITY.



WE CHALLENGE THE WORLD FOR ITS EQUAL.  
The cheapest, most durable and effective Tool for  
Cleaning Tubes Hot or Cold.  
**RUFFNER & DUNN, Schuylkill Falls, Philadelphia, Pa.**  
Patentees and sole Manufacturers of the *Excelsior*  
Punch Tube Scrapers. Most liberal discounts to dealers.  
Send for Circulars.



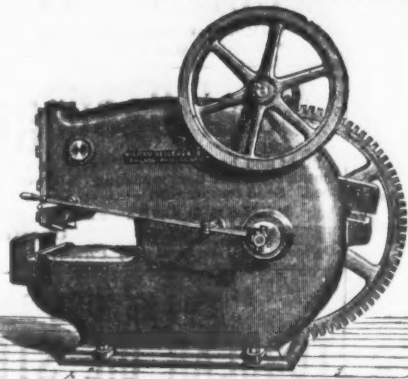
**THE CRESCENT STEEL TUBE SCRAPER.**  
—FINEST TOOL MADE—  
SEND FOR ILLUSTRATED PRICE LIST.  
Presented May 22, 1883.

## Machinery, &amp;c.

**WILLIAM SELLERS & CO.,**  
PHILADELPHIA.

Manufacturers of

Iron & Steel Work-  
ing Machinery,  
MACHINISTS' TOOLS,  
SHAFTING,  
GEARING &c.,  
INJECTORS.



Shearing Machine.

BRANCH OFFICE, 79 Liberty Street, New York.

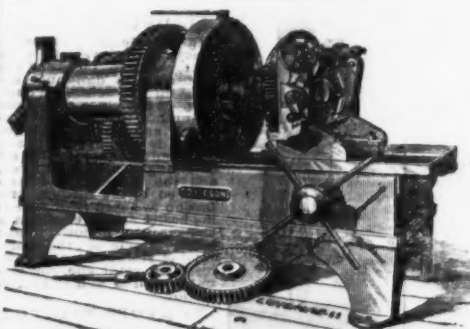
**SOUTHWARK FOUNDRY &  
MACHINE CO.,**

430 Washington Ave., PHILA., PA.,

ENGINEERS AND MACHINISTS.

BLOWING ENGINES AND  
HYDRAULIC MACHINERY.

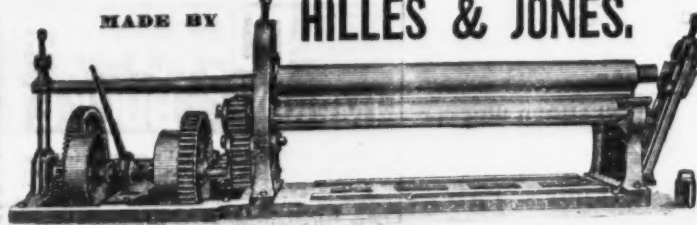
SOLE MAKERS OF THE

PORTER-ALLEN AUTOMATIC CUT-OFF  
STEAM ENGINE.

Machines for Threading  
and Cutting off Pipe from  
one-eighth inch to twelve  
inches diameter. Hand  
Screwing Machines one-  
eighth inch to two inches.

**COX & SONS,**204 N. 4th St.,  
PHILADELPHIA, PA.PATENT  
PLATE**BENDING ROLLS**

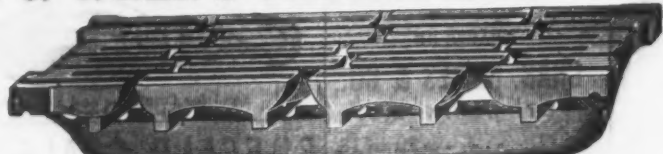
MADE BY

**HILLES & JONES.**

THE CUT REP-  
RESENTS ALL  
SIZES THAT  
ARE DRIVEN  
BY BELTS.

It is but the work of a moment to balance the top roll and lower the hinge housing to take out the plate when a full circle is bent. The rolls are all made of solid wrought iron, the balance bar being a part of extension of the top roll. There is a cast iron bed-plate under the entire machine. To save any shifting of belts, we put in Friction Pulleys, which enable the rolls to be started, stopped or reversed instantly.

WILMINGTON, DELAWARE.

**W. C. WREN'S PATENT GRATE BAR.**

**DAVID S. CRESWELL, Manufacturer,**  
316 Race Street,  
The most durable Grate Bar on the market.  
Send for circular and price list.

**HARRISON BOILER.**BOILER MADE  
OF

SPHERES

MUST

UNITE GREATEST

HARRISON BOILER.  
—THE SAFEST—  
1874 Wood St.  
PHILA.

STRENGTH

WITH MOST

HEATING SURFACE.

Send for

CIRCULAR.

## Machinery, &amp;c.

**CORLISS ENGINE BUILDERS**  
WITH  
WETHERILL'S IMPROVEMENTS

ENGINEERS, MACHINISTS, IRON FOUNDERS  
AND  
**BOILER MAKERS.**  
**ROBT. WETHERILL & CO. Chester, Pa.**

STOW FLEXIBLE SHAFT CO., Limited

15th & Pennsylvania Ave.  
PHILADELPHIA, PA.,  
Manufacturers of

Portable Drilling, Tap-  
ping, Reaming and  
Boring Machines.  
Also, Tools for Emery  
Wheel Grinding, Metal &  
Wood Polishing, Cattle  
Brushing & Clipping, &c.

General Euro-  
pean Agents  
**BOLLING &  
LOWE, 2 Law-  
rence Point-  
ney Hill, Lon-  
don, England.**

**CHARLES W. ERVIEN & CO.,**

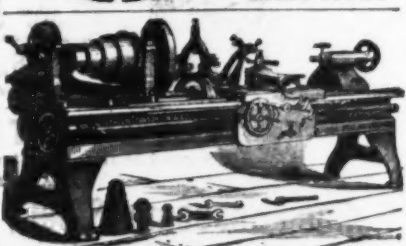
Engine Builders, Boiler  
Makers and  
**GENERAL MACHINISTS,**  
IRELAND STREET, PHILADELPHIA.

## PHILA. SHAFTING WORKS.

GEO. V. CRESSON,  
18th & Hamilton Sts.  
PHILADELPHIA.

**SHAFTING  
A SPECIALTY.**

Manufacturers of  
Shafting, Pulleys,  
Hangers, Couplings,  
and every apparat-  
us used in the  
TRANSMISSION OF  
STEAM POWER.



**ISRAEL H. JOHNSON, Jr., & CO.,**  
Tool and Machine Works,  
Manufacturers of

ENGINE, BRASS FINISHERS', WOOD TURNERS',  
AMATEURS' and JEWELLERS' LATHES,  
Slide Rest, Screw Machines, Torus Heads, Screw  
Presses, Screw Clamps, Lathe Carriers, &c.  
1422, 1424 & 1426 Callowhill Street, Philadelphia, Pa.  
Israel H. Johnson, Jr. Joshua R. Johnson, Jr.

Established 1867.

**Edwin Harrington & Son,**MANUFACTURERS OF  
PATENT EXTENSION AND  
SCREW CUTTING**LATHES**Iron Planers,  
Radial, Upright, Suspension  
Multiple and Lever**DRILLS,**  
and a variety of other  
MACHINISTS' TOOLSPatent  
Double Chain Screw  
Pulley Blocks,  
Unrivalled for Durability, Safe-  
ty and Power.Patent Double Chain  
Quick-Lift Hoists,  
with Brake for quick and  
lowering.

Circulars furnished.

WORKS AND OFFICE,  
Cor. N. 15th and Penna. Ave.,  
Philadelphia, Pa. U. S. A.Represented by J. Q. MAY-  
NARD, 12 Cortlandt St., N. Y.,  
C. E. KIMBALL, 91 High St.,  
Boston, W. H. RICEY, 126 Main  
St., Cincinnati.**E. L. HARRINGTON,**Manufacturers of  
MACHINISTS' TOOLS  
AND  
Special  
Machinery.UPRIGHT DRILLS A  
SPECIALTY.426 N. 23d Street  
(Cor. of Linn),  
Philadelphia.**G. E. BRETTELL,**Furnace St.,  
Rochester, N. Y.Planers a Specialty.  
24x24, 30x36 and 30x30  
in. to plane 7 and 10 ft.  
long.

SEND FOR PRICE LIST.

**G. E. Brettell,**

Rochester, N. Y.



**TUBAL SMELTING WORKS,**  
760 & 762 Broad Street, PHILADELPHIA.  
**PAUL S. REEVES,**  
MANUFACTURER OF  
**GENUINE BABBITT METAL**  
AND ALL GRADES OF  
**ANTI-FRICTION METALS.**

**WM. & HARVEY ROWLAND,**  
PHILADELPHIA,

P. O. Address: Frankford, Pa. MANUFACTURERS OF ALL KINDS OF

**Elliptic, Platform AND C Springs,**

"Brewster Side-Bar Combination Patented" Springs and  
Timken's Patent Cross Springs,

Reiff's Patent, Groot's Patent, Carter's Patent and Salade's Patent Crescent Spring,  
MADE EXCLUSIVELY FROM

SWEDISH STOCK, OIL-TEMPERED and WARRANTED.

Swedish Tire, Toe, Blister and Spring Steel.

CAST SPRING AND PLOW STEEL.  
CAST SHOVEL, HOE AND MACHINERY STEEL.

OXFORD TOE, SLEIGH, TIRE AND SPRING STEEL.  
BESSEMER SHOVEL AND PLOW STEEL.  
BESSEMER MACHINERY AND CULTIVATOR STEEL.

RE-ROLLED NORWAY SHAPES.  
NORWAY NAIL RODS ROLLED AND SLIT FROM SUPERIOR BRANDS.

**STEEL CASTINGS**  
FROM 1-4 TO 15,000 LBS. WEIGHT.  
True to pattern, sound and solid, of unequalled strength, toughness and durability. An invaluable substitute for forgings, or for cast iron requiring three-fold strength. Gearing of all kinds, Shoes, Dies, Hand-machinists, Crossheads for Locomotives, etc. 30,000 Crank Shafts and 10,000 Gear wheels of this Steel now running prove its superiority over other Steel Castings. CRANK SHAFTS, CROSSHEADS AND GEARING ARE SPECIALTIES. Castings of every description. Circulars and Price Lists free. Address:  
**CHESTER STEEL CASTINGS CO.,**  
Works, Chester, Pa. 407 Library St., Philadelphia.

**PITTSBURGH STEEL CASTING CO.,**  
26th and Railroad Streets, PITTSBURGH, PA.  
MANUFACTURERS OF

Refined Bessemer Steel; Improved Steel Castings  
Under Hainsworth's Patents.

We are now prepared to fill orders for refined **BESSEMER BILLETS** or **BLOOMS** any desired carbon and a uniform quality.  
We would call attention of consumers to the fact that we use good material, and produce a steel pronounced by competent judges equal to the best English or German spring and soft steels.  
Having had twelve years' experience in the making of **STEEL CASTINGS**, we are able to refer to our customers in all parts of the United States and Canada as to the quality of our work in this line. We make castings of steel practically free from blow-holes, as soft and easily worked as wrought iron, yet stiff, strong and durable, with a tensile strength of not less than 65,000 pounds to the square inch. In short, our castings unite the qualities of steel and wrought iron.  
Wheels, Pinions, Cranks, Dies, Hammer Heads, Engines and Machinery Castings of all descriptions, Railroad Frogs and Crossings, Plowshares, Moldboards and Landslides.  
Special attention given to Heavy Castings. We use no cast iron in our castings. Send for circular.

**Drop HAMMERS.**  
**Punching Presses.**  
**DIES AND OTHER TOOLS**  
For the manufacture of all kinds of  
**SHEET METAL GOODS,**  
**DROP FORGINGS, &c.**  
**Stiles & Parker Press Co.,**  
Middletown, Conn.

**NO FLANGED WHEELS.**  
**Warner's Patent**  
**SLIDING**  
**DOOR HANGER,**  
MANUFACTURED BY  
**E. C. STEARNS & CO.,**  
SYRACUSE, N. Y.  
SALES OF  
**CHAS. HUMES & CO.,**  
ST. LOUIS MO.  
1877. . . . 20 SETS.  
1881. . . . 500 SETS.  
Send for Illustrated Catalogue.

**BRADLEY'S**  
**CUSHIONED HAMMER**  
STANDS TO-DAY  
WITHOUT  
AN EQUAL.  
Over 500 in use.  
It approaches nearer the  
action of the smith's arm  
than any hammer in the  
world.  
**Bradley & Co.**  
SYRACUSE, N. Y.  
(Established 1820.)

**STANLEY G. FLAGG & CO.**  
PHILADELPHIA, PA.  
Office and Works,  
N. W. cor. 19th St. & Pennsylvania Ave.  
Manufacturers of  
**STEEL CASTINGS.**  
A Substitute for Steel & Wrought Forgings.  
Circulars sent on application.

**Steel Castings.**

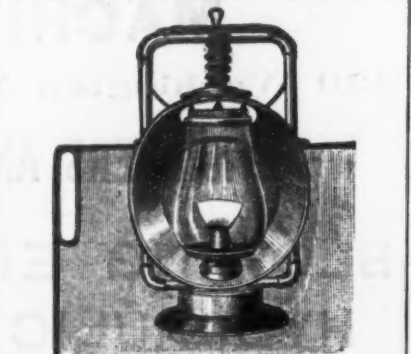
Light and heavy Steel Castings of superior  
metal, solid and homogeneous. All work guaran-  
teed. Send for circular.

**KUREKA CAST STEEL CO.,**  
Chester, Pa.  
Office: 307 Walnut St., Phila.

**"DIETZ"**  
**TUBULAR OIL STOVE**  
FOR 1883.

**"DIETZ" No. 0 TUBULAR**  
**REFLECTOR LANTERN,**

WITH DASH ATTACHMENT.  
Throws a Powerful Light more than 100 feet.



56 Fulton Street, - - NEW YORK.  
25 Lake St., CHICAGO.

**TACKLE BLOCKS.**

Rope and Iron Strap of all kinds. Lig-  
sumvitae Wood for Ten-Pin Balls.

**Wm. H. McMillan & Bro.,**  
Office, 112 South Street, New York  
Factory, 33 to 40 Penn St., Brooklyn, N. D.

**COLUMBIA BICYCLE.**  
The Bicycle, as a permanent,  
practical road vehicle, is an  
acknowledged fact, and the  
thousands in daily use are  
constantly increasing in num-  
bers. It combines speed and  
endurance that no horse can  
equal, and for pleasure or  
health is far superior to any  
other out-door sport. The art  
of riding is easily acquired,  
and the exercise is recom-  
mended by the medical pro-  
fession as a means of renew-  
ing health and strength, as it  
brings into action almost  
every muscle of the body.  
Send 3c stamp for 34-page il-  
lustrated catalogue, contain-  
ing prices and full informa-  
tion.  
**THE POPE MFG. CO.,**  
597 Washington St., Boston, Mass.  
New York Riding School, 34th  
Street, near 3rd Avenue.

THE BEST IN USE.

**DU'S**  
**IMPROVED ELEVATOR**  
**BUCKET**

This is the only scientifically constructed bucket  
in the market. It is struck out from charcoal  
stamping iron. "No corners to catch." "No  
seams to burst." "No interior corners to clog  
up." It runs with great ease and half the power  
of the old style bucket. Will outwear half a  
dozen of them. Prices Reduced.

**T. F. ROWLAND, Sole Mfr.,**  
BROOKLYN, N. Y.

**MICHIGAN BLOCK WORKS.**  
Detroit, Mich., U. S. A.

Send for Catalogue and Price List.

**BUFFALO SCALE CO.,**  
BUFFALO, N. Y.

Manufacturers of  
**R. R. Track Scales, Hay Scales, Coal**  
**Scales, Grain Scales, Platform**  
**Scales, Counter Scales, &c.**  
Send for price list, stating what you want.

**Scranton Brass Works,**  
**J. M. EVERHART,**  
Manufacturer of  
**BRASS WORK,**

For Water, Gas & Steam. Also  
Carr & Wilcox's Patent Cut Files.  
Will cut faster, wear longer, and clog  
less than any file in the market.

41st Street, - - SCRANTON, PA.

**BLACKSMITH DRILLS.**  
**CLARK SINTZ & Co.**

**RUSSELL, BURDSALL & WARD.**

PORTCHESTER, N. Y.,

MANUFACTURERS OF

**CARRIAGE, TIRE, PLOW, STOVE & OTHER BOLTS.**

Carriage Bolts made from Best Square Iron a Specialty.

**JOHN RUSSELL CUTLERY CO.,**

Green River Works,

MANUFACTURERS OF

**Table and Pocket Cutlery,**

BUTCHERS', HUNTERS', PAINTERS', DRUGGISTS' & HOUSEHOLD KNIVES

IN ALL STYLES AND VARIETIES.

OLDEST AND LARGEST AMERICAN MANUFACTURERS.

Factories,



Turners Falls, Mass.

**F. W. WURSTER,**  
**IRON FOUNDRY**  
**AND AXLE WORKS,**  
150 to 142 First St.,  
Brooklyn, N. Y.

**AXLES**

SUPERIOR  
WAGON, CART AND  
CARRIAGE AXLES.

Our facilities enable us to quote the  
trade lower prices than any other  
manufactory. Send for price list.

**J. M. CARPENTER**  
**PAWTUCKET, R. I.**

MANUFACTURER OF TAPS AND DIES.

**"BOYNTON'S" UNRIVALED SOLID**  
**STEEL SAW SET.**

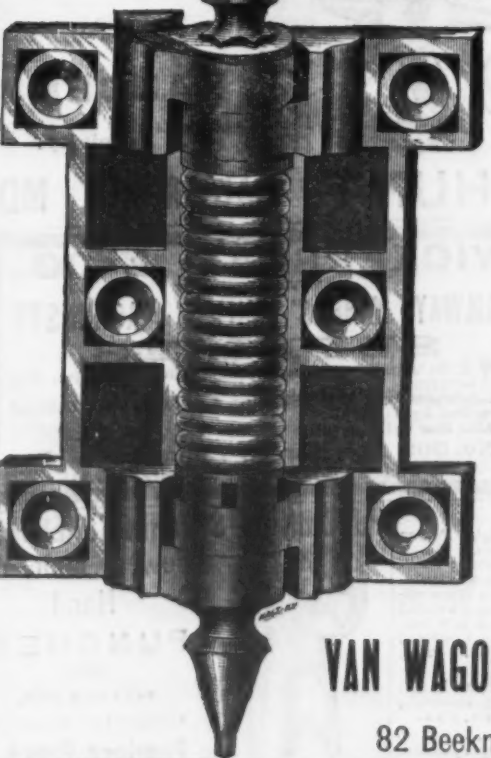


**E. M. BOYNTON SAW & FILE CO.**  
84, 86, 88, 90 & 92 DEVOT ST.  
BROOKLYN.

**E. M. BOYNTON.**  
80 Beekman Street, NEW YORK.

EMPIRE

**SPRING HINGES.**



**SINGLE**  
AND  
**DOUBLE**  
**ACTING.**

FOR  
**SCREEN**  
**DOORS.**

MANUFACTURED BY

**VAN WAGONER & WILLIAMS,**

82 Beekman St., New York.

**WM. GILMOR of WM., BALTIMORE, MD.,**

Rivets,  
Spikes,  
Bolts,  
Nuts,



Washers,  
Bolt Ends,  
Wood Screws,  
Track Bolts,

**BOILER AND BRIDGE RIVETS.**  
Carry stock with New York Agents, LOVEJOY & DRAKE, 111 Beak Street.